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Contents

The Controller Reference Volumes 1, 2, and 3 contain separate “reference books” for each of the following controllers. Each book is entirely self-contained, with its own table of contents and index.

Volume 1	Volume 2	Volume 3
Allen-Bradley Interface Reference	Honeywell FSC Integration Reference	Honeywell UDC Integration Reference
Applicom Interface Reference	Honeywell LCS620 Interface Reference	Honeywell Universal Modbus Interface Reference
ASEA interface Reference	Honeywell Micromax Interface Reference	Modbus Interface Reference
Bristol Babcock Interface Reference	Honeywell RM7800 Flame Safeguard Interface Reference	Moore APACS Interface Reference
Bristol Babcock OpenBSI Interface Reference	Honeywell Series 9000 Integration Reference	Moore Mycro Interface Reference
DNP3 Protocol Interface Reference	Honeywell Safety Manager Integration Reference	OPC Client Interface
GE Fanuc Series 90 Interface Reference	Honeywell TDC 3000 Data Hiway Interface Reference	Siemens S5 and S7 Interface Reference
GEC GEM80 Interface Reference		Yamatake MA500 Interface Reference
Hitachi Interface Reference		
Honeywell DPR Interface Reference		
Honeywell EXCEL 5000 Interface Reference		

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Allen-Bradley Interface Reference

Issue	Date
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Getting started

1

This reference describes how to set up, configure, and test Allen-Bradley controller communications with the server. There is detailed information for defining the controller using Quick Builder.

Complete each step before commencing the next.

Steps for connecting and configuring an Allen-Bradley controller.

Steps	Go to:
Connect the PLC to the server	page 12
Set the communication parameters	page 28
Use Quick Builder to define channels	page 38
Use Quick Builder to define controllers	page 44
Download channel and controller definitions from Quick Builder to the server	
Test the communications link	page 70
Define points either by: <ul style="list-style-type: none">• Using Quick Builder• Using Allen-Bradley software	page 54 page 73

Support and documentation for Allen-Bradley



Note

Wherever it refers to Logix5550, it is also applicable to Logix5555.

The server supports the following Allen-Bradley processors:

- PLC (supported in native mode)
- PLC-2 (supported in native mode)
- PLC-3 (supported via PLC-2 compatibility files)
- PLC-5 (supported in native mode)
- SLC500 (supported in native mode)
- Logix5550

Processor Connections Supported



Note

- Rockwell RSLinx version 2.43 is required for all connection types except Serial.
 - For ControlLogix Gateway connections see “ControlLogix Gateway” on page 7.
 - If the connection between the server and the Allen-Bradley controller is through a Honeywell Data Highway Port (DHP) and a TDC 3000 Data Hiway, the interface is configured as a TDC 3000 DHP. For details, see the *TDC 3000 Controller Reference*.
-

Table 1 Supported Connection Types

PLC Type	Connection Type				
	Serial [*]	DH+ ^{**}	DH485 ^{***}	Ethernet	ControlNet ^{****}
PLC	Yes				
PLC2	Yes				
PLC3	Yes				
PLC5	Yes	Yes		Yes	Yes
SLC500	Yes	Yes	Yes	Yes	Yes
Logix5550		Yes *****		Yes *****	Yes *****

* Both full and half duplex is supported.

** Can be connected via a serial connection to KF2, or direct DH+ connection through a KT interface card, or an Ethernet connection via a pyramid integrator for SLC and PLC5.

*** Can be connected via a serial connection to a KF3 module.

**** A 1785 KTC or PCIC card is required.

***** A 1756 DHRIO module is required.

***** A 1756 ENET module is required.

***** A 1756 CNET module is required.

Table 2 ControlLogix Gateway

Server Connection	PLC Connection		
	ControlNet	Ethernet	DH+
DH+	Yes	No	Yes
Ethernet	Yes	No	Yes
ControlNet	Yes	No	Yes

Other documentation for Allen-Bradley

Read the manuals that came with your Allen-Bradley processor before attempting to install or configure the interface.

If you are using Rockwell RSLinx or RSLinx OEM, see the RSLinx online help for details about how to configure a driver. Both versions are referred to as RSLinx in this guide.

Allen-Bradley-specific terms

Communications link

Data Hiway (DH), Data Hiway Plus (DH+), DH-485, ControlNet or Ethernet

DE Module

The Prosoft 3700 DE Module (installed on an Allen-Bradley PLC-5) and Prosoft 3750 DE Module (installed on Allen-Bradley SLC-500) are required in order to communicate with Honeywell Smart Transmitters. The DE module address can only be used as a source address.

DEM Module

The Prosoft 3700 or 3750 DEM module. Similar in function to the DE module but uses less memory. The DEM memory mapping is a subset of the DE mapping. Consult the Prosoft 3700/3750 for further instructions.

File

The file is a block of words or some other structure in the PLC or SLC memory addressable as a unit. Allen-Bradley PLC-5 and SLC-500 use files instead of registers to store bits of information.

Hardware Diagnostic Scan

One scan per controller every diagnostic period for automatic recovery from communications failure with the PLC.

Mismatch Condition

If there is a mismatch between the read and write databases of the transmitter, the Controller Configuration display in Station shows which transmitter values are mismatched and what their old and new values are. You can monitor mismatches by configuring alarms for points reading the smart transmitter values. By double-clicking the alarm on a Station display, the Controller Configuration display is called up to display the mismatched values.

PD file

An Allen-Bradley PLC-5 uses files (similar to registers) to store information. A different file type is used for each data type (integer files, floating point files, and so on). The PD file type stores data for PID loops.

Periodic Data Acquisition Scan

A defined regular interval in which the server database acquires information from the data tables in the PLC and processes the values as point parameters. For the source address, the scan period assigned should reflect both the rate at which the

value held in memory changes and its importance to the process (critical or non-critical). There is one periodic data acquisition scan per scan packet.

PID loop

(Proportional Integral and Derivative) control algorithm. A control loop that usually contains a setpoint (SP), output (OP) and mode (MD) values.

U6BCD Data Format

Two consecutive words of PLC memory are each used to hold three digits of the value (least significant word first). The three digits are in the least significant part of each word.

Allen-Bradley controller setup

2

This chapter describes how to set up an Allen-Bradley controller for the system.
The tasks for setting up a Allen-Bradley controller are:

For	Go to:
Supported architectures	page 12
Communication settings	page 28

Architectures

Connections

PLC Connection	Go to:
Serial connection to DH+ using the 1770-KF2 communications interface module (CIM)	page 12
Direct serial connection to PLC serial port	page 15
Multi-drop serial connection to PLC serial port	page 15
Direct ControlNet connection to PLC-5	page 21
Direct DH+ connection using the 1784-KT adapter	page 20
Direct Ethernet connection to processors with a built-in Ethernet port	page 18
Ethernet connection using the Pyramid Integrator Gateway	page 18
ControlLogix Gateway (routing between nodes on different networks)	page 21
Serial connection to DH-485 using 1770-KF3	page 17
Logix5550	page 26



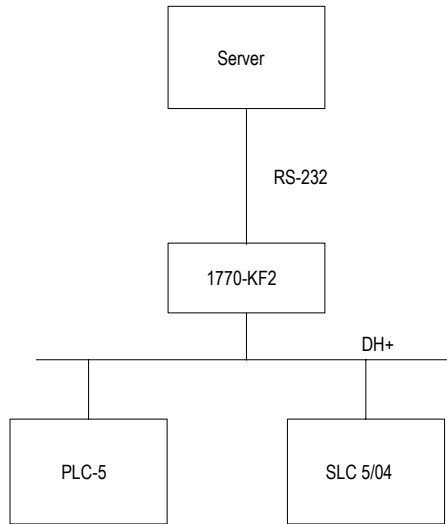
Note

Redundant serial connections are also supported. When a redundant serial connection is used, PLC-5 unsolicited messages are not supported.

Serial full duplex connection to PLC on DH+ using 1770-KF2

A PLC-5 and a SLC 5/04 connected to a server using a 1770-KF2 Communications Interface Module.

Figure 1 Allen-Bradley system architecture for a 1770-KF2 connection



Server to 1770-KF2 RS-232 cable

The following figures show the computer pinouts for a RS-232 connection using a 9-pin or 25-pin serial port, respectively.

Figure 2 RS-232 connection to 9-pin serial port

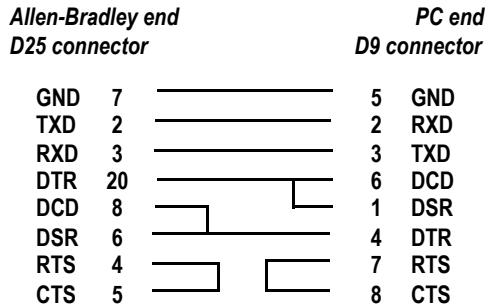


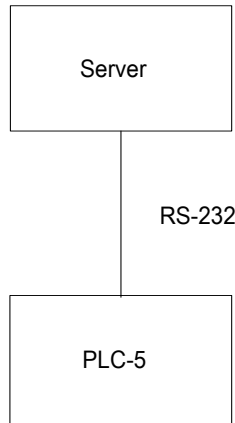
Figure 3 RS-232 connection to 25-pin serial port

<i>KF3 end</i>			<i>PC end</i>	
<i>D25 connector</i>			<i>D9 connector</i>	
	1	Shield		
TXD	2	_____	2	RXD
RXD	3	_____	3	TXD
RTS	4	_____	8	CTS
CTS	5	_____	7	RTS
GND	7	_____	5	GND
DSR	6	_____	4	DTR
DCD	8	_____	6	DSR
DTR	20	_____	1	DCD

Full duplex connection to PLC's serial port

“Server connection to PLC-5 using a RS-232 cable” on page 14 shows a serial connection to a PLC-5 serial port.

Figure 4 Server connection to PLC-5 using a RS-232 cable



Server to PLC-5 RS-232 cable

The following figures show the computer pinouts for a RS-232 connection using a 9-pin or 25-pin serial port, respectively.

Figure 5 RS-232 connection to 9-pin serial port

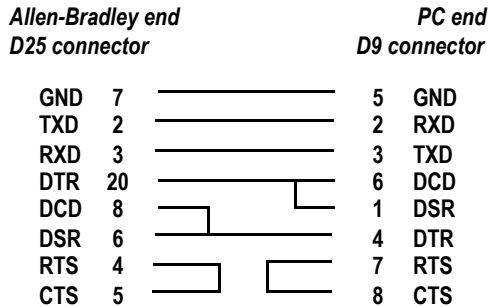
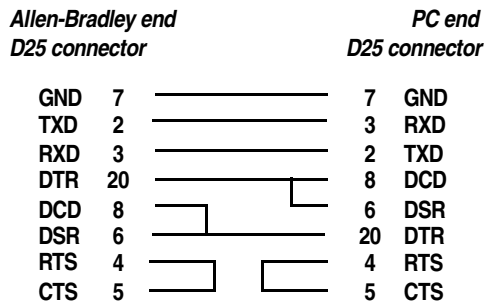


Figure 6 RS-232 connection to 25-pin serial port



PLC-5 serial port settings

Configure the serial port for DF1 point-to-point. For details, see the *Allen-Bradley PLC-5 Software Configuration Maintenance Manual*.

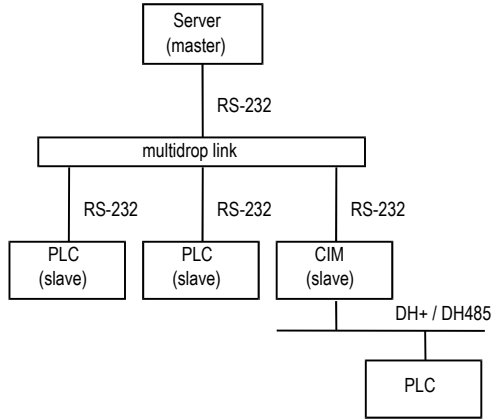
Half duplex serial interface

The Half Duplex serial interface supports all types (except Logix5550) of Allen-Bradley PLCs and Communication Interface Modules (CIM) currently supported by the server, providing that the PLC or CIM can be configured as a slave node communicating using the Allen-Bradley half duplex protocol.

The server connects to Allen-Bradley PLCs in a multidrop fashion as shown in “Half duplex master/slave multidrop architecture” on page 16. The server and the PLCs (and/or CIM) are nodes on this half duplex communication network. The server acts as the master node and the PLCs (and/or CIM) are slaves.

Each node must have a unique node number between 0 and 254 (decimal). Node number 0 is always used by the server. The slave nodes must each have a unique node number between 1 and 254.

Figure 7 Half duplex master/slave multidrop architecture



The multidrop link can be implemented by different types of communication hardware. Examples of such are RS-232/RS-485 converters and radio/modem links.

Communications support

The Half Duplex interface supports communications with PLCs for server data acquisition and control requests as well as unsolicited messages from PLCs.

Setting half duplex communication protocols on PLC and CIM

For PLCs, use the appropriate Allen-Bradley programming loader software to configure the serial port of the PLC to use Half Duplex communications protocol and handshaking. Again using the loader software, assign a unique node number (between 1 and 254) to the PLC. See the programming loader software manual for more details.

For CIMs, use the dip switches to set the CIM to use Half Duplex communications protocol and handshaking and to set the node number. See the CIM manual for more details.

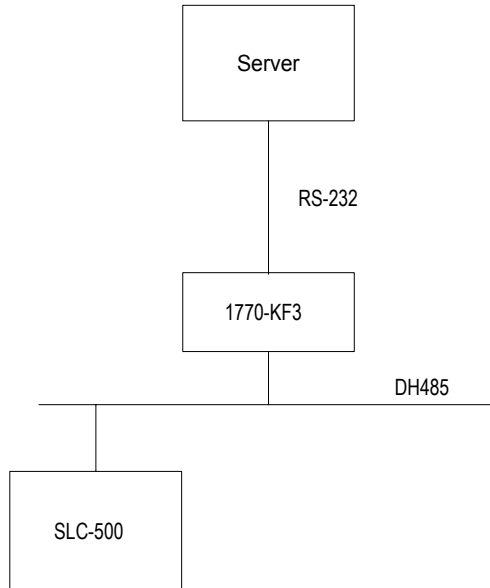
Multidrop link setup

The multidrop link setup depends on the hardware used. See the manuals that came with your communication hardware.

Serial connection to SLC-500 using 1770-KF3

An SLC-500 connects through the 1770-KF3 module to the server.

Figure 8 Serial connection to SLC-500



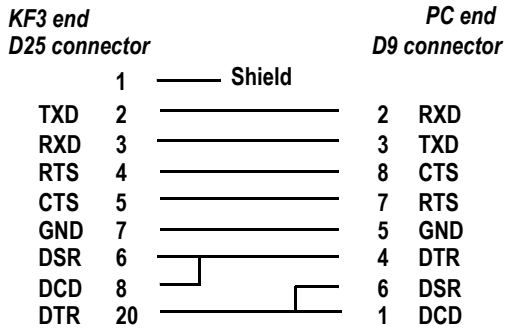
Server to 1770-KF3 RS-232 cable

The figures show the pinouts for a KF3 connection using the 25-pin or 9-pin serial port respectively.

Figure 9 KF3 connection to computer 25-pin serial port

<i>KF3 end</i>			<i>PC end</i>	
<i>D25 connector</i>			<i>D25 connector</i>	
	1	Shield		
TXD	2	_____	3	RXD
RXD	3	_____	2	TXD
RTS	4	_____	5	CTS
CTS	5	_____	4	RTS
GND	7	_____	7	GND
DSR	6	_____	20	DTR
DCD	8	_____	6	DSR
DTR	20	_____	8	DCD

Figure 10 KF3 connection to computer 9-pin serial port



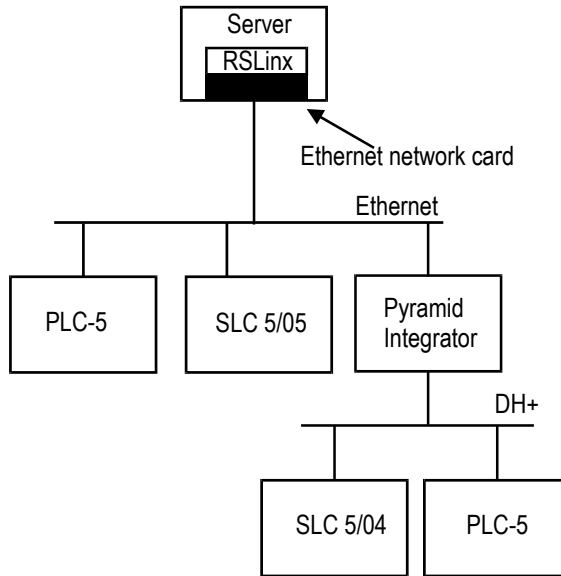
1770-KF3 communication settings

The recommended communication settings for the 1770-KF3 are the factory defaults.

The DH-485 node address should be unique on the DH-485 network. The default is 0.

Ethernet connection to PLC-5 and SLC-500

“Ethernet connection to PLC-5 and SLC-500” on page 19 shows a PLC-5 and SLC-500 connected locally to the Ethernet. It also shows a PLC-5 and SL-500 connected to the Ethernet link through a Pyramid Integrator. This architecture requires the Rockwell RSLinx software.

Figure 11 Ethernet connection to PLC-5 and SLC-500

RSLinx is required to communicate with PLCs connected by way of Ethernet, 1784-KT adapter, or Pyramid Integrator Gateway. See the *Installation Guide* for information on installing RSLinx and the Ethernet adapter.

Setting up the PLC and Pyramid Integrator



Note

RSLinx does not support unsolicited messages through a Pyramid Integrator gateway. Therefore, unsolicited messages cannot be sent to and from a PLC-5 if it is connected via a Pyramid Integrator.

For instructions on setting up the PLC Ethernet port or Pyramid Integrator, see the Allen-Bradley documentation.

When using a Pyramid Integrator, a boot server is required. Currently there is no boot server program for NT. Instead, a 16-bit boot server program called “dtlbootw” is available from Rockwell. It can be downloaded from Rockwells FTP site.

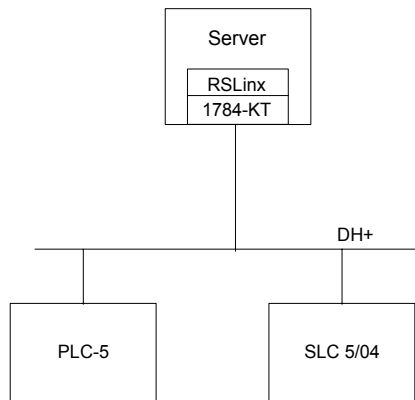
To use the boot server:

- 1 Use the bootptab file to specify hosts (Pyramid Integrator) to be downloaded. It is configured similarly to the INTERCHANGE bootptab.txt file.
- 2 Add the sm (subnet mask) entry.
- 3 Start the executable, dt1bootw.exe.
- 4 A window displays while the software listens for boot request from the Pyramid Integrator. Hosts that broadcast Ethernet hardware addresses located in the bootptab file are downloaded.

Direct DH+ connection using 1784-KT

A PLC-5 and a SLC 5/04 connected to the server through a 1784-KT.

Figure 12 Server connection using a 1784-KT adapter



Installing the 1784-KT adapter

When installing the 1784-KT adapter, you need to set its IRQ and memory address. For details, see the Allen-Bradley KT Adapter documentation.

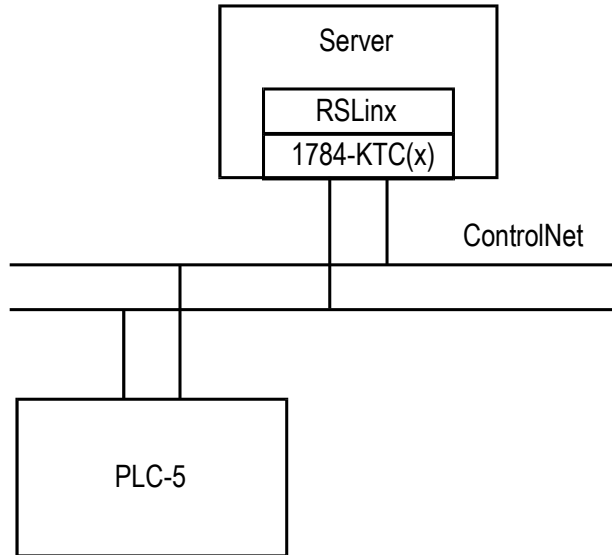
Setting up RSLinx

In setting up RSLinx, a driver needs to be configured for the 1784-KT interface. For details, see the RSLinx online help.

Direct ControlNet connection to PLC-5

A PLC-5 connected to the server through a ControlNet Interface card.

Figure 13 Connection using ControlNet



Communication setup

For information about installing the ControlNet adapter and RSLinx, see the *Installation Guide*.

In setting up RSLinx, a driver needs to be configured for the ControlNet interface. For details, see the RSLinx online help.

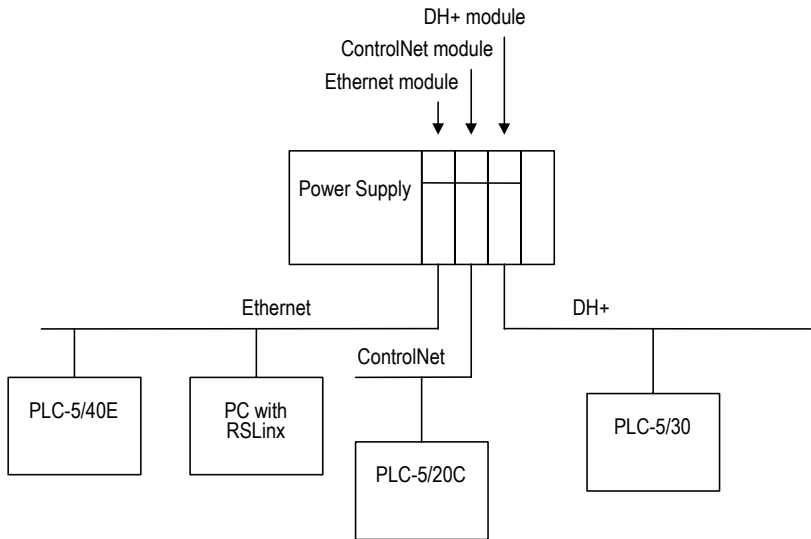
ControlLogix Gateway

A ControlLogix Gateway system is made up of Communication Interface modules (CIMs) residing in slots of a ControlLogix Gateway chassis. Different types of CIMs may reside in the chassis enabling communications between nodes on different networks.

Connection architecture

An example of a ControlLogix Gateway system with different CIM types.

Figure 14 Example ControlLogix Gateway system

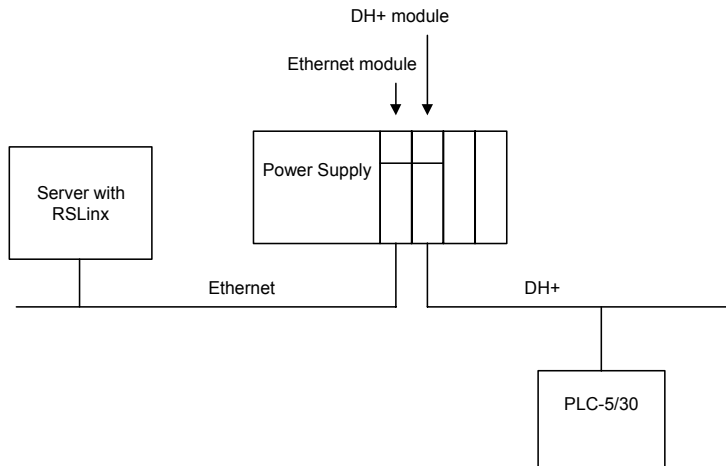


Many different ways of routing between nodes on different networks are possible with a ControlLogix Gateway system. See the appropriate Allen-Bradley ControlLogix Gateway documentation for configuration details of the ControlLogix Gateway CIMs.

The following figures show the supported architectures.

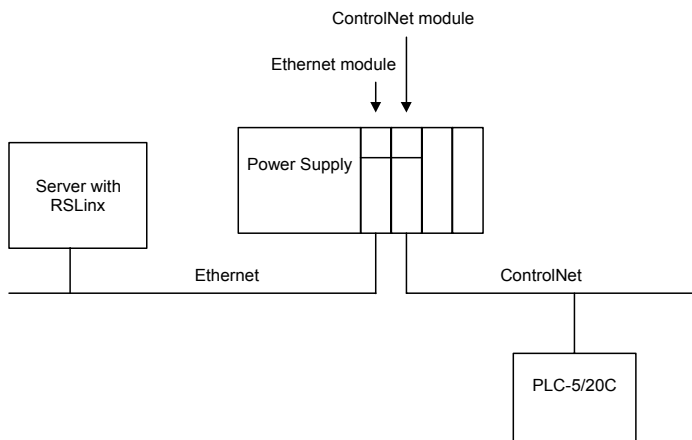
Ethernet to DH+

Figure 15 Communication to PLCs on DH+ via Ethernet



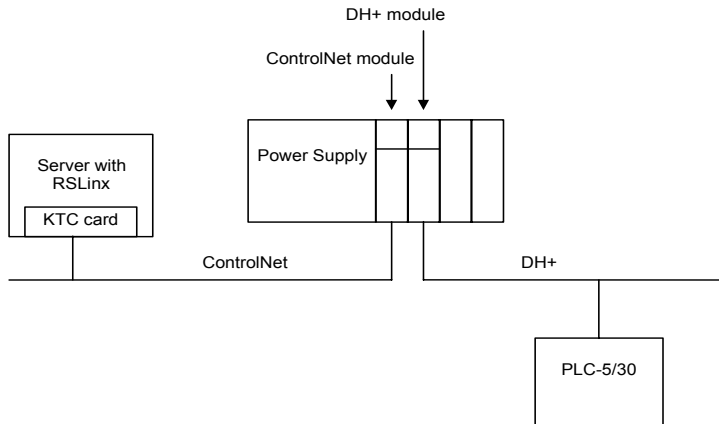
Ethernet to ControlNet

Figure 16 Communication to PLCs on ControlNet via Ethernet



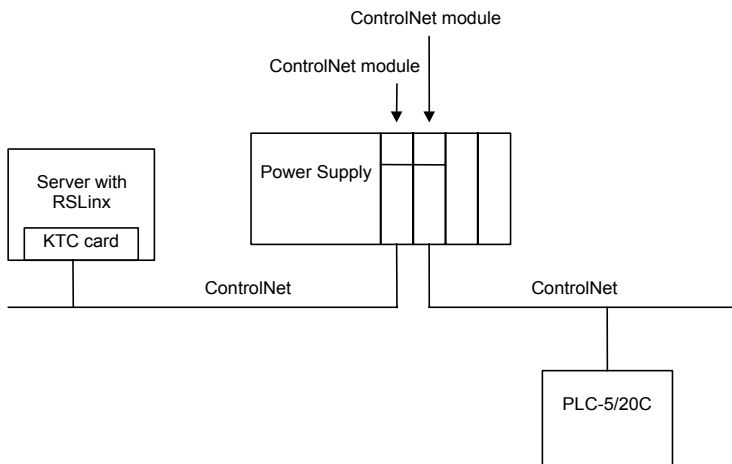
ControlNet to DH+

Figure 17 Communication to PLC on DH+ via ControlNet



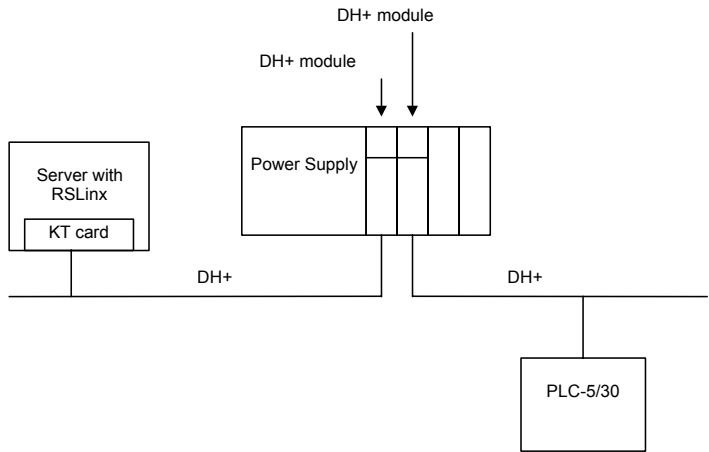
ControlNet to ControlNet

Figure 18 Communication to PLCs on ControlNet via ControlNet



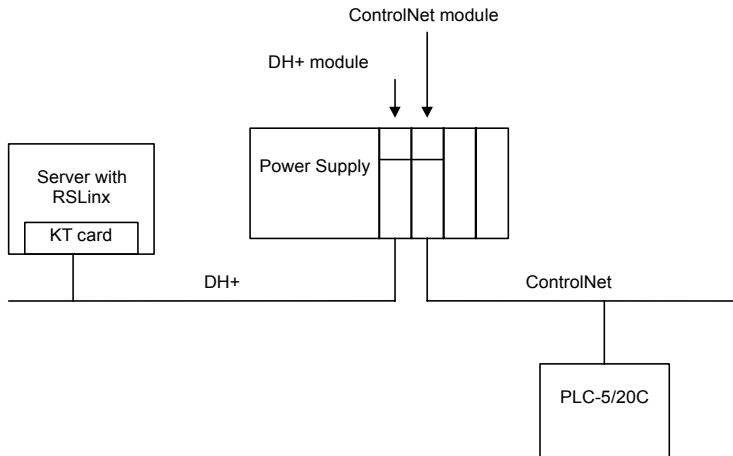
DH+ to DH+

Figure 19 Communications to PLCs on DH+ via DH+



DH+ to ControlNet

Figure 20 Communication to PLCs on ControlNet via DH+



Logix5550

A Logix5550 controller may reside in any slot in an Allen-Bradley ControlLogix chassis. Communication interface modules (CIMs) residing in other slots of the same chassis provide communication to the Logix5550 controller via the backplane.

For communications to a Logix5550 controller, Rockwell Software RSLinx is required. Install RSLinx on the server.

Install the appropriate communication interface card in the server. See the communication interface card's installation documentation for details.

Install the CIM and the Logix5550 controller in the ControlLogix chassis. Connect the communication interface card and the CIM module to the appropriate common network.

Configure an appropriate driver under RSLinx for the communication interface card. See the RSLinx online help for details. RSwho in RSLinx can then be used to verify the connection.

At present the following architectures are supported.

Figure 21 Connection through 1756-CNB module

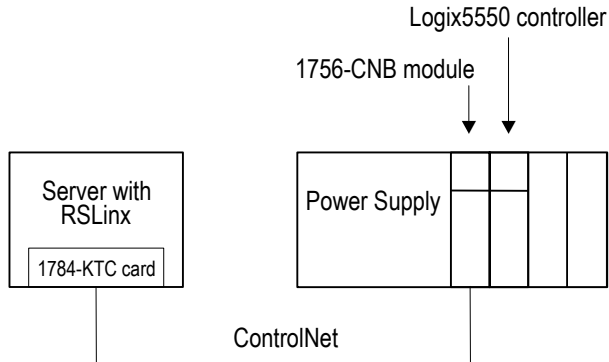


Figure 22 Connection through 1756-ENET module

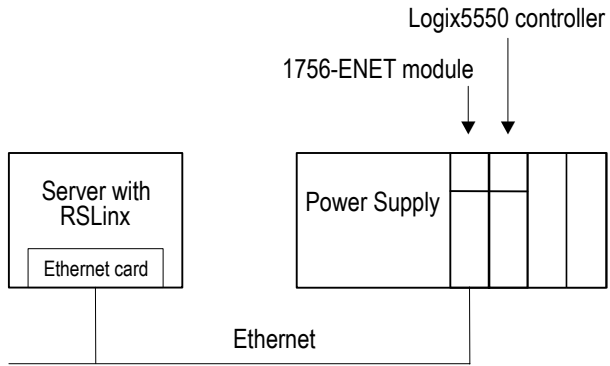
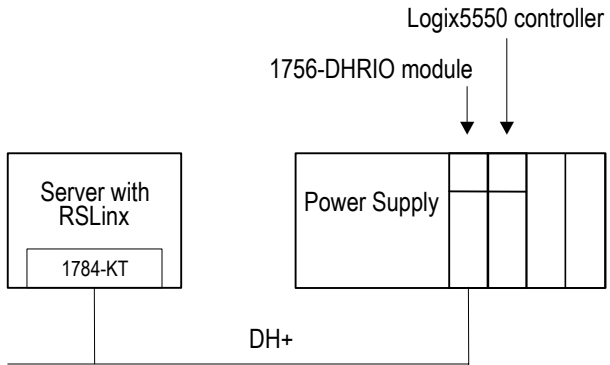


Figure 23 Connection through 1756-DHRIO module



Communication settings

Serial connection

Each PLC is considered to be a station on the Data Highway and must have a unique station address (or station ID) configured.

When using a KF2 module to connect the server to the Data Highway, it must also have a unique station ID on the Data Highway. To communicate with the PLCs on the Data Highway, the server takes on the KF2 station ID.

These parameters must also be configured on the KF2:

- Baud rate
- Parity
- Protocol (RS-232)
- Full/Half Duplex



Note

The KF2 must be configured so that diagnostic commands are not passed through to the server and that embedded responses are disabled. See the Installation Manual for the recommended KF2 switch settings.

Connections using RSLinx

When using Rockwell RSLinx software, you need to configure a driver for each connection type. The server uses the RSLinx driver name to identify the driver. Always use the default driver name when adding a new driver.

In a redundant server system both servers must be configured identically.

Using an SLC-500 for Smart Transmitter Access

By installing a ProSoft DE Module (3750 DEM) in the SLC-500, up to 8 smart transmitters can be accessed. Information transfer is accomplished using ladder logic provided by the ProSoft 3750 DE Module (3750 DEM) to files within the SLC-500. These files act as the master database to the transmitters, with the SLC-500 as the database owner.

These files can be uploaded, downloaded, or modified from a Station display. See “Viewing and modifying smart transmitter variables” on page 84.

Using a PLC-5 for Smart Transmitter Access

By installing a ProSoft DE Module (3700 DEM) in the PLC-5, up to 16 smart transmitters can be accessed. Information transfer is accomplished using ladder logic provided by the ProSoft 3700 DE Module (3700 DEM) to files within the PLC-5. These files act as the master database to the transmitters, with the PLC-5 as the database owner.

**Note**

The Firmware revision for the DE module should be 1.33.

These files can be uploaded, downloaded, or modified from a Station display. See “Viewing and modifying smart transmitter variables” on page 84.

Configuring points

Logix5550 controller tag configuration

Using the RSLogix 5000 programming software, configure tags with data types of integer, double integer or real (floating point) as required.

After the tag arrays are created and mapped to PLC-5 data table addresses, you can build points to reference elements within different tag arrays.



Tip

If you wish to use named addressing with the Logix5550 you can use the OPC client interface and the Rockwell OPC server.

Logix5550

Data acquisition and control requests sent to the Logix5550 controller can be made in its native protocol or using a subset of the Allen-Bradley DF-1 protocol. The Logix5550 Controller Interface uses the later method, employing PLC-5 type of addressing, commands and functions. Using this method, the Logix5550 controller only supports reading values from and writing values to tags with data types of integer (16-bit), double integer (32-bit) or floating point. Tag to data table address mapping must also be configured in the Logix5550 controller.

This is done through the programming software of the Logix5550 in offline mode and then downloaded to the Logix5550 controller.

From the menu, select **Logic > Map PLC/SLC Message**. In the dialog box specify the PLC-5 file number to Logix5550 tag mapping.

Using Quick Builder to configure points

You use Quick Builder to define and configure points to reference data in a Logix5550 PLC. The address format for points referencing Logix5550 tags are similar to those used for PLC-5. See “Defining an Allen-Bradley address for a point parameter value” on page 54.

Configuring unsolicited messages

Logix5550

The Allen-Bradley Logix5550 Controller Interface supports PLC-5 type of unsolicited messages from a Logix5550 controller. Configuring unsolicited messages involves the following steps:

- 1 Create one tag of type message (message control structure) for each MSG instruction.
- 2 Add a MSG instruction in the appropriate place in a ladder logic rung.
- 3 Configure the MSG instruction. Under the Configuration tab, in the Message Type field select PLC-5 Typed Write. In the Source Tag field select the source tag. Specify the number of elements from the source tag to be sent in the Number Of Elements field. In the Destination Element field specify the PLC-5 address to receive the data.
- 4 Select the Communication tab. Select the **CIP with Source ID** radio button under Communication Method. Specify the CIP (ASA) path. CIP path numbers specified in RSLogix 5000 are separated by commas.

The CIP path specifies the path the unsolicited message takes to reach the server from the Logix5550 controller. See the *Allen-Bradley Logix5550 Controller User Manual* (publication 1756-6.4.1 March 1998) for more details about CIP path.

ControlNet connection details are as follows:

- 1st ASA path number is 1 indicating that the message will go out through the backplane.
- 2nd ASA path number is the slot number of the CNB module.
- 3rd ASA path number is 2 indicating that the message should leave the CNB module through its ControlNet port.
- 4th ASA path number is the MAC ID of the KTC card in the server.
- 5th and 6th ASA path numbers are 1 and 0 respectively. This indicates the internal backplane port and the pseudo slot number used by RSLinx.
- In the Source Link field, type the MAC ID of the CNB module which passes the message to the server.
- In the Destination Link field, type the virtual link id configured in RSLinx.
- The virtual link id is found in RSLinx by selecting from the Menu **Communications\Configure Client Applications\Virtual Link ID**.
- In the Destination Node field, type the number 77.

PLC-5

This section gives a brief description of the process. For a detailed description of the MSG instruction, see the *Allen-Bradley PLC-5 Programming Software-Instruction Set Reference Manual*.

For the MSG instruction, a control block of file type Integer (N) or Message (MG) is required. The MG file type is only available for some PLC-5 processor types.

To configure the PLC-5 to send unsolicited messages to the server, use the following settings for control block fields. These settings are applicable to all connection/architecture types supported by the server.

Table 3 PLC-5 control block fields

Control Block Fields	Settings
Communication Command	Set to PLC-5 Typed Write
PLC-5 Data Table Address	Starting word of the source file
Size in Elements	The number of elements to be transferred
Destination Data Table Address	The same as the PLC-5 Data Table Address

Example

To send the data in Integer file N12 from element 0 to element 9 in the server, you would use the following settings:

Table 4 Example of PLC-5 control block fields

Control Block Fields	Settings
Communication Command	PLC-5 Typed write
PLC-5 Data Table Address	N12:0
Size in Elements	10
Destination Data Table Address	N12:0

The MSG instruction sends data in packets. For PLC-5s on DH+ the maximum data size per packet is 244 bytes. The number of elements per packet depends on the file type. If the size in elements specified in a MSG instruction results in more than 244 bytes of data, the PLC automatically generates multiple packets.

For example, if a MSG instruction is configured to send 100 consecutive elements of a floating point file (4 bytes per element), the PLC generates two packets to send the values for all the 100 elements.

For Ethernet PLC-5s, MSG instructions that send data through the Ethernet port can have packet data size greater than 244 bytes.

Control block field settings relevant to specific connection/architecture types are described in the following tables.

Table 5 Serial connection via KF2 module

Control Block Fields	Settings
Local Remote	Set to Local
Local Node	Set this to the DH+ address of the KF2 module
Port Number	Set this to be the DH+ port number on the PLC-5

Table 6 Direct DH/DH+ connection using KT card

Control Block Fields	Settings
Local Remote	Set to Local
Local Node	Set this to the address of the KT Card
Port Number	Set this to be the DH+ port number on the PLC-5

Table 7 Direct ControlNet connection using KT card

Control Block Fields	Settings
Local Remote	Set to Local
Local Node	Set this to the MAC address of the KT Card
Port Number	Set this to 2 (see “ASA path segments” on page 49)

Table 8 Ethernet connection - local

Control Block Fields	Settings
Internet (IP) Address	Set this to the IP address of the server
Port Number	Set this to be the Ethernet port number of the PLC-5

Table 9 Ethernet connection - remote via Pyramid Integrator

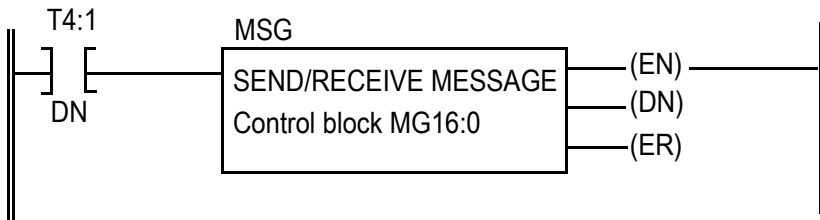
Control Block Fields	Settings
Local Remote	Set to Local
Local Node	Set this to be the address of the Ethernet port of the Pyramid Integrator
Port Number	Set this to be the DH+ port number on the PLC

Table 10 Direct serial connection

Control Block Fields	Settings
Local Remote	Set to Local
Port Number	Set to 0
Controller Station Id	Set to the DH+ port number on the PLC

The condition(s) under which an unsolicited message is to be sent from the PLC-5 to the server depends on the application. For example, an unsolicited message may be sent to the server periodically. Consider the following:

Figure 24 Unsolicited message transmission



An unsolicited message is sent when the DN bit of timer T4:1 is set. This means that the frequency of sending of messages depends on the period of the timer.

KF2 settings

DIP switch recommended settings

You set up the KF2 module's characteristics on the DIP switches that are located on the under-side of the module.

Switch group SW1 — asynchronous link features

With the serial connection architecture, the Allen-Bradley PLC server interface only supports both the full-duplex and half-duplex mode of communications. Note that embedded responses must be disabled.

Table 11 Allen-Bradley 1770-KF2 switch group 1 settings

Protocol	Error Check	Parity	Embedded Response	Switch				
				1	2	3	4	5
Full Duplex	BCC	none	no	off	off	n/a	n/a	off
Full Duplex	BCC	even	no	on	off	n/a	n/a	off
Half Duplex	BCC	none	no	off	off	n/a	n/a	on
Half Duplex	BCC	even	no	on	off	n/a	n/a	on
Half Duplex	CRC	none	no	on	on	n/a	n/a	on

Switch groups SW2 SW3 and SW4 — node number

The KF2 module must have a unique network node number (ID) on the Data Highway/Data Highway Plus network.

Switch groups SW2, SW3 and SW4 are used to set the network node number. Each switch group is used to represent an octal digit with SW2 representing the most significant (left-most) digit and SW4 representing the least significant (right-most) digit. Individual switches in a switch group represent a bit: OFF is 0 (zero) and ON is 1, with the left-most switch representing the most significant bit.

For Data Highway the node number is a 3-digit octal number. Valid node numbers for the KF2 module on a Data Highway are 010 to 077 and 110 to 376 octal.

For Data Highway Plus the node number is 2 digits. Both switches in switch group SW-2 must be set to off. Valid node numbers for the KF2 module on a Data Highway Plus are 00 to 77 octal.

Switch group SW5 —network communication rate

Both switches should be set to ON.

Switch group SW6 —asynchronous communication rate and diagnostic commands

Switches 1 to 3 specify the communication rate. Switch 4 determines how the KF2 module treats diagnostic commands sent to it by a remote node. This switch must be set to ON to prevent any diagnostic commands being passed on to the server.

Table 12 Allen-Bradley 1770-KF2 switch group 6 settings

Bits/second	Switch			
	1	2	3	4
110	off	off	off	on
300	on	off	off	on
600	off	on	off	on
1200	on	on	off	on
2400	off	off	on	on
4800	on	off	on	on
9600	off	on	on	on
19200	on	on	on	on

Switch group SW-7 — network link selection**Table 13** Allen-Bradley 1770-KF2 switch group 7 settings

Network	Switch	
	1	2
Data Highway	off	off
Data Highway Plus	on	off

Switch group SW-8 — selection of RS-232 or RS-422**Table 14** Allen-Bradley 1770-KF2 switch group 8 settings

Network	Switch	
	1	2
RS-232	off	on
RS-422	on	off

Allen-Bradley controller configuration and addressing

3

This chapter describes how to configure an Allen-Bradley controller for the system using Quick Builder. For each configuration procedure, there is detailed information covering all supported Allen-Bradley devices.


The Quick Builder controller configuration tasks are described:

For:	Go to:
Steps for defining a Allen-Bradley channel	page 38
Steps for defining a Allen-Bradley controller	page 44
Defining an address for a point parameter value	page 54
How to optimize scanning performance	page 65
Overcoming server address space limitations	page 65

Defining an Allen-Bradley channel

You need to define a channel for the connection the server uses to communicate with the Allen-Bradley controllers.

To define a channel using Quick Builder:

- 1 Click  to add a channel.
- 2 In the Add Items dialog box, select channel as the item and Allen-Bradley as the channel type.
- 3 Enter the channel details on the Main property page for the channel. For help with the channel definitions, see Allen-Bradley Channel Main properties.
- 4 To complete the channel definition, click the Port tab and define a port. See “Allen-Bradley Port properties” on page 40.
- 5 If this communications link is being used as a redundant link, after you complete the port definition, click the Redundant Port tab. Enter the same kind of port definition on the Redundant Port property page. The redundant port must have a different port name.



Note

To modify an Allen-Bradley controller or channel after it has been downloaded, see “Modifying a channel or controller after download” on page 64.

Allen-Bradley Channel Main properties

Use the Main tab to enter the basic channel properties for a Allen-Bradley channel.

Property	Description
Name	The unique name of the channel. A maximum of 10 alphanumeric characters (no spaces or double quotes).
Description	(Optional) Type a description of the channel. A maximum of 30 characters can be used, including spaces.

Property	Description
Marginal Alarm Limit	<p>The communications alarm marginal limit at which the channel is declared to be marginal. When this limit is reached, a high priority alarm is generated. A channel barometer monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer increments by 2 or more, depending on the error and decrements for each good call.</p> <p>To calculate an acceptable limit, multiply the square root of the number of controllers on the channel by the Marginal Alarm Limit defined for those controllers. (Normally, you specify the same value for all controllers on a channel). For example, if there are 9 controllers on the channel and their Marginal Alarm Limit is set to 25, the value would be $[\sqrt{9}] \times 25 = 75$.</p>
Fail Alarm Limit	<p>The communications alarm fail limit at which the channel is declared to have failed. When this barometer limit is reached, an urgent alarm is generated.</p> <p>Set this to double the value specified for the channel Marginal Alarm Limit.</p>
Half Duplex Protocol	<p>Check this box if the server communicates via a serial link to the Allen-Bradley PLC and the PLC is configured for Half-Duplex protocol. Half-Duplex protocol is typically used where the server communicates to the PLC over a radio link.</p>
Primary PLC Check Rate	<p>The rate at which the Allen-Bradley interface will check for the primary status of the controller. Use this when configuring redundant ControlNet PLC5 support.</p>
Write Delay	<p>If the channel is on a serial port, specify the number of milliseconds that the server will wait before writing to the controller.</p> <p>A write delay is usually specified only if:</p> <ul style="list-style-type: none"> • The server communicates to the PLC over a half-duplex radio link and the radio system requires time to key in each direction before the server or PLC can send data. • The radio system implements RTS/CTS handshaking
Diagnostic Scan Period	<p>Enter the amount of time (in seconds) between diagnostic scan requests if you do not want the default, 60. Note that the diagnostic scan period must be a valid server scan period.</p>

Property	Description
Connect Timeout	Amount of time, in seconds, the server will wait to connect to the controller before abandoning the connection. Type a new value in this field if you do not want the default, 10 seconds. Use the default value unless the communications line has a high error rate or unless you are using modems.
Read Timeout	Amount of time, in seconds, that the server will wait for a reply from the controller. Type a new value in this field if you do not want the default, 2 seconds. Use the default value unless the communications line has a high error rate or unless you are using modems.
Item Type	Shows the type of item specified when this item was created.
Last Modified	Shows the date of the most recent modification to this channel's property details.
Last Downloaded	This shows the date that the item was last downloaded to the server.
Item Number	This field displays the unique item number currently assigned to this item by Quick Builder. You can change the item number displayed in this field if you need to match your current server database configuration. The item number must be between 1 and the maximum number of channels allowed for your system.

Allen-Bradley Port properties

The Port tab defines the communication-related properties for a channel. The **Port Type** for Allen-Bradley can be:

- **Serial**. A serial communications interface, such as RS-232. See “Serial Port properties” on page 41.
- **TerminalServer**. A communications link that enables controllers with a serial interface to be connected to a LAN. See “TerminalServer Port properties” on page 42.
- **RSLinx**. A communication link through RSLinx. See “RSLinx Port properties” on page 42.

Serial Port properties

The Serial Port settings must match the settings on your communication devices.

Property	Description
Serial Port Name	The device name of the serial port.
Baud Rate	The number of data bits per second. The default is 9600.
Number of Data Bits	The number of data bits used for transmission. The default is 8.
Stop Bits	The number of stop bits used for transmission. The default is 1.
Parity	The parity verification used on the port. The default is NONE.
Checksum	The type of checksum error detection used for the port. Select the value that matches the setting on the communication device: <ul style="list-style-type: none"> • CRC16_0 (if Cyclic Redundancy Check (CRC) is set) • TWOSCOMP (if Longitudinal Redundancy Check (LRC) is set)
XON/XOFF	The type of XON/XOFF software flow control used to stop a receiver from being overrun with messages from a sender. The types are: <ul style="list-style-type: none"> • None (default) • Input (use XON/XOFF to control the flow of data on the receive line) • Output (use XON/XOFF to control the flow of data on the transmit line)
Handshaking Option RS-232	<p>Enable RTS/CTS flow control. Select this if you want to use RTS/CTS for flow control to stop a receiver from being overrun with messages from a sender.</p> <p>Detect DCD. Select this if the Data Carrier Detect communication status line of the COM port requires monitoring (usually when using modem or microwave linking). When selected, the communications fails if the desired COM status line is not high—for example, on a dial-up link connection for a modem.</p> <p>Detect DSR. Select this if the Data Set Ready communication status line of the COM port requires monitoring (usually when using modem or microwave linking). When selected, the communications fails if the desired COM status is not achieved.</p>

TerminalServer Port properties

Property	Description
Terminal Server TCP Host Name	The name and port number of terminal server to which the channel is connected.
Terminal Server TCP Port No	You can specify either a TCP host name or an IP address, but it must match the TCP host name used when you installed and internally configured the terminal server.
Idle Timeout	The time, in seconds, the channel waits for a successful connection to the server before closing the connection. A value of 0 indicates that the connection is never closed.
Checksum	The type of checksum error detection used for the port. Select the value that matches the setting on the communication device: <ul style="list-style-type: none"> • CRC16_0 (if Cyclic Redundancy Check (CRC) is set) • TWOSCOMP (if Longitudinal Redundancy Check (LRC) is set)

RSLinx Port properties

A RSLinx channel requires the following Allen-Bradley specific entries:

Property	Description
Driver Name	The name of the RSLinx driver. Example: AB_ETH-1 (default RSLinx Ethernet driver name)



Note

When communicating via an Ethernet module on a ControlLogix system, use the RSLinx driver type (configured under RSLinx) “Remote Devices via Linx Gateway”, not the “Ethernet devices”. The “Ethernet devices” driver type should only be used for Ethernet PLC-5’s.

Do not change the name of the RSLinx driver chosen by RSLinx. The Allen-Bradley interface uses the driver name to determine if the connection is Ethernet, KTC or PCIC. It only recognizes the default.


Redundant Port properties

A communication port used as a redundant link has the same channel name but a requires a different port name to its twin. All other entries are identical to those of the primary port.

Defining an Allen-Bradley controller

You need to define a separate controller for each PLC. Depending on how much data you want to address in the PLC, you might need to define multiple logical controllers to address different areas of one PLC's memory.

To define a controller using Quick Builder:

- 1 Click  to add a controller.
- 2 In the Add Items dialog box, select Controller as the item and Allen-Bradley as the controller type.
- 3 Enter the property definitions for the controller on the controller Main property page.



Note

To modify an Allen-Bradley controller or channel after it has been downloaded, see “Modifying a channel or controller after download” on page 64.

Allen-Bradley Controller Main properties

Use the Main tab to define the basic properties for a Allen-Bradley controller.

Property	Description
Name	The unique name of the controller. A maximum of 10 alphanumeric characters (no spaces or double quotes). For LAN connected controllers, the name must not contain underscore (_) characters. This name is used to look up the IP address in the TCP/IP database if you do not specify an IP Address property.
Description	(Optional) Type a meaningful description for this controller. A maximum of 30 characters, including spaces, can be entered.
Channel Name	The name of the channel on which the controller communicates. In the list of channel names, click the name. You need to have defined the channel in order for it's name to appear in the list.

Property	Description
Marginal Alarm Limit	<p>The communications alarm marginal limit at which the controller is declared to be marginal. When this value is reached, a high priority alarm is generated. This limit applies to the controller barometer which monitors the total number of requests to the controller and the number of times the controller did not respond or response was incorrect. The barometer increments by 2 or more, depending on the error and decrements for each good call. The default value is 25.</p>
Fail Alarm Limit	<p>The communications alarm fail limit at which the controller is declared to have failed. When this value is reached, an urgent alarm is generated.</p> <p>Type a new value in this field if you do not want the default, 50. To determine an acceptable limit, double the marginal alarm limit value specified.</p>
PLC Type	<p>Select the PLC type from the list.</p>
PLC Station ID	<p>The PLC Station ID depends on the way the controller is connected.</p> <p>For PLC's on DH+ or DH485 network this is the node number of the PLC on the network.</p> <p>For PLC's on ControlNet this is the MAC address of the PLC.</p> <p>For direct Ethernet connection this is the station number used in the RSLinx Ethernet driver to map to the PLC's IP address.</p> <p>For Logix5550 this is the slot number of the ControlLogix Gateway chassis where the controller resides.</p> <p>For half duplex slave controllers, this is the slave node number of the controller's serial port.</p>
Offset	<p>The address offset. The default is 0, no offset.</p> <p>PLC-5. Enter the address offset for the first address of every file referenced by this controller.</p> <p>You must also enter a value for the Number of Files and the Base File to complete the address range definition of this controller.</p>
Number of Files	<p>(Only applicable to PLC-5, SLC-500 and Logix5550.)</p> <p>Enter the number of PLC-5 or SLC-500 files configured for the controller. The default is 10; the maximum is 32.</p> <p>Note: You cannot modify this value after downloading the controller definition to the server unless you delete the controller definition from the server first.</p>

Property	Description
Data Table Area	(Only applicable to PLC-5.) Enter the PLC-5 data table area number. The default is 0.
Base File	(Only applicable to PLC-5, SLC-500 and Logix5550.) Enter the file number of the first addressable file. The default is 0. Note: For a PLC-5, the address space per file (addressable by the controller) equals the size of the hardware cross-reference record divided by the number of files (maximum number of files = 32) configured for the controller. For detailed explanations of base file, number of files, and offset entries for a PLC-5 see “Defining a PLC-5 controller using base file, number of files, and offset” on page 52.
No Midnight Reinitialization	Select to disable midnight re-initialization. By default, the server re-initializes all controllers at midnight. Controller re-initialization might not be desirable when there are a large number of controllers built on a channel or the entire bandwidth of the channel is being utilized.
Diagnostic on Fail Only	Select to set the diagnostic scan to occur only when the controller is in a FAILED state. This might be desirable if the entire bandwidth of the channel for this controller is being utilized.
Item Type	Shows the type of item specified when this item was created.
Last Modified	Shows the date of the most recent modification to this channel’s property details.
Last Downloaded	This shows the date that the item was last downloaded to the server.
Communications Gateway	This property is only visible if RSLinx is selected as the port type for the channel to which this controller belongs. Select one of the following: <ul style="list-style-type: none"> • None • Pyramid Integrator • ControlLogix

Property	Description
Redundant PLC-5	<p>This property is only visible if the following properties are set:</p> <ul style="list-style-type: none"> • RSLinx is selected as the port type for the channel to which this controller belongs • PLC-5 is selected as the PLC Type • None or ControlLogix is selected as the Communication Gateway <p>This indicates the controller is representing a redundant ControlNet PLC-5 pair.</p> <p>Note: 1785-CHBM required.</p>
Backup PLC id	<p>This property is only visible if the following properties are set:</p> <ul style="list-style-type: none"> • RSLinx is selected as the port type for the channel to which this controller belongs • PLC-5 is selected as the PLC Type • None or ControlLogix is selected as the Communication Gateway • Redundant PLC-5 check box is checked <p>This indicates the ControlNet MACid of the backup PLC-5 of a redundant pair.</p> <p>Note: The MACid's used for a redundant PLC-5 pair must be consecutive and that the lower MAC address must be odd.</p>
Primary/Backup status Indicator Address	<p>This property is only visible if the following properties are set:</p> <ul style="list-style-type: none"> • RSLinx is selected as the port type for the channel to which this controller belongs • PLC-5 is selected as the PLC Type • None or ControlLogix is selected as the Communication Gateway • Redundant PLC-5 check box is checked <p>Specifies the file address within the PLC-5 which indicates the primary/backup status of the PLC. This should be no more than 6 characters. The file number does not have to fall within the file range as defined by Base File and Number of Files for the controller.</p>
CIM Slave Node Number	<p>This property is only visible if Serial is selected as the port type and the Half Duplex Protocol check box is checked for the channel to which this controller belongs.</p> <p>Type in the CIM Slave Node Number. Valid numbers range from 1 to 254.</p>

Property	Description
PI Station ID	<p>This property is visible only if RSLinx is selected as the port type for the channel to which this controller belongs and the communications gateway selected is Pyramid Integrator.</p> <p>Type in the station ID assigned to the Pyramid Integrator in RSLinx.</p>
PI Module	<p>This property is visible only if RSLinx is selected as the port type for the channel to which this controller belongs and the communications gateway selected is Pyramid Integrator.</p> <p>From the drop-down list, select the module type on the Pyramid Integrator used by the server to communicate with the PLC-5, either RM or KA.</p>
PI Pushwheel	<p>This property is visible only if RSLinx is selected as the port type for the channel to which this controller belongs and the communications gateway selected is Pyramid Integrator.</p> <p>Type in:</p> <ul style="list-style-type: none"> • 0 for an RM Module • 1 through 4 for a KA Module
PI Channel	<p>This property is visible only if RSLinx is selected as the port type for the channel to which this controller belongs and the communications gateway selected is Pyramid Integrator.</p> <p>From the list of channels, select the Pyramid Integrator channel.</p>
ASA Path	<p>This property is visible only if RSLinx is selected as the port type for the channel to which this controller belongs and the communications gateway selected is ControlLogix.</p> <p>This is a series of numbers, separated by dashes, that defines the route to the PLC. See “ASA path” on page 49.</p>
PLC Connected to DHRIO Module	<p>Select to indicate the PLC is connected to a DHRIO module in a ControlLogix Gateway system.</p>
Item Number	<p>This field displays the unique item number currently assigned to this item by Quick Builder. You can change the item number displayed in this field if you need to match your current server database configuration. The number must be between 1 and the maximum number of controllers allowed for your system.</p>

ASA path

An ASA path specifies the communication path to take to reach a particular destination. Such a path must be specified when building a controller in the server for a Logix5550 or a PLC connected through a ControlLogix Gateway system. An ASA path is represented by a series of numbers. The length of the series is variable. When using Quick Builder to build a controller, the numbers in the series are separated by dashes.

The following table shows the ASA path segments to be used for Logix5550.

Table 15 ASA path segments

Connection Type	1 st ASA number	2 nd ASA number	3 rd ASA number
DH+	0	DH+ address of the DHRIO module	1 for backplane
Ethernet	1	N/A	N/A
ControlNet	2	MAC address of the CNB module	1 for backplane

The following tables show the ASA path segments to use for PLC’s connected through a ControlLogix Gateway system. The ControlLogix Gateway module to which the server is connected is referred to as the “IN” module and the ControlLogix Gateway module to which the PLC is connected is referred to as the “OUT” module.

Table 16 ASA path segments number for different IN module types

IN Module Type	1 st ASA number	2 nd ASA number	3 rd ASA number	4 th ASA number	5 th ASA number
DH+	0	IN module’s DH+ address	1 for backplane	OUT module’s slot number	*
Ethernet	1	OUT module’s slot number	*	N/A	N/A
ControlNet	2	IN module’s ControlNet MAC address	1 for backplane	OUT module’s slot number	*

* See “ASA path segments number for different OUT module types” on page 49.

Table 17 ASA path segments number for different OUT module types

OUT module type	ASA number
DH+	2 for Channel A; 3 for Channel B
ControlNet	2 for the ControlNet port



Note

Slot number in a ControlLogix Gateway chassis starts with zero and increases from left to right. Slot zero is the slot next to the power supply.

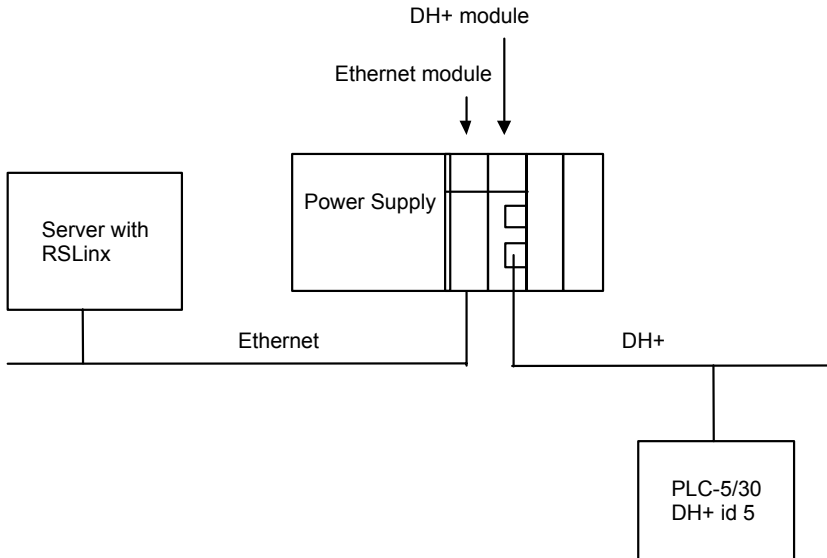
Example The following are examples of ASA Paths.

Ethernet to DH+ connection

For the following architecture the controller definition to be specified in Quick Builder should be:

```
2 NAME=PLC530 ID=5 CLG_DHRIO ASA_PATH=1-1-3
```

Figure 25 Ethernet to DH+ connection example

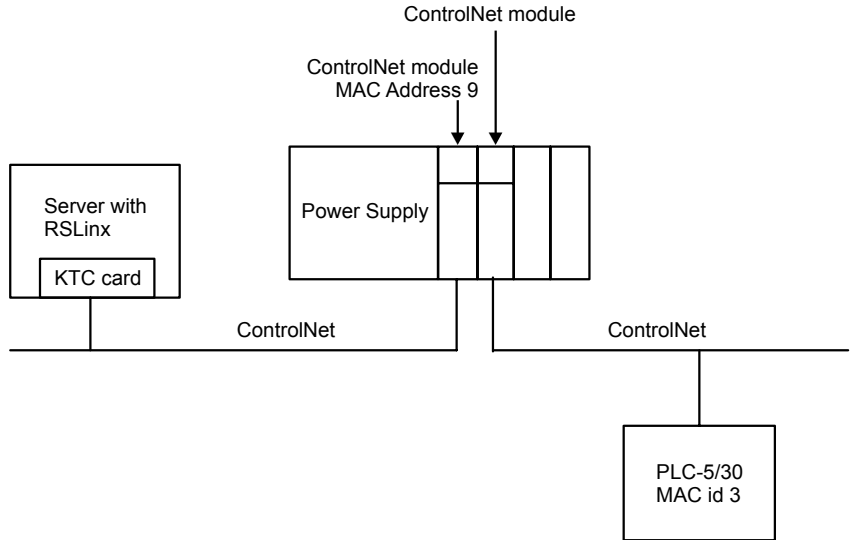


ControlNet to ControlNet connection

For the following architecture the controller definition to be specified in Quick Builder should be:

2 NAME=PLC520C ID=3 ASA_PATH=2-9-1-1-2

Figure 26 ControlNet to ControlNet connection example

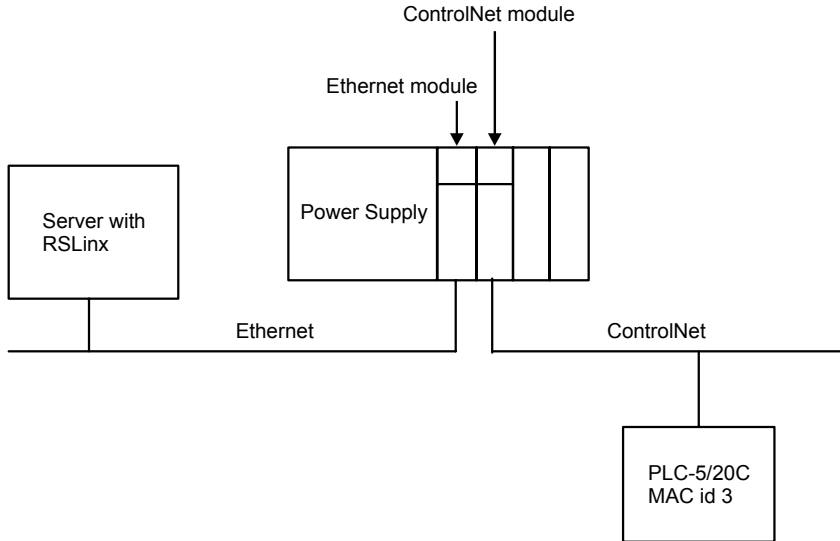


Ethernet to ControlNet connection

For the following architecture the controller definition to be specified in Quick Builder should be:

```
2 NAME=PLC520C ID=3 ASA_PATH=1-1-2
```

Figure 27 Ethernet to ControlNet connection example



Defining a PLC-5 controller using base file, number of files, and offset

When defining a PLC-5 controller, the default entries are:

- Base File = 0
- Offset = 0
- Number of Files= 10

Calculating address space for a PLC-5 controller definition

The address space size of a server controller is 32766 words. This controller address space is divided evenly into the Number of Files (default is 10) specified when configuring the controller. With the default Base File of 0 and Number of Files of 10 the server controller can address file 0 through to file 9 in the PLC-5 with 3276 words in each PLC-5 file being addressable by the server controller.

The number of elements that the server controller can address within a certain PLC-5 file depends on the file type.

Example

- If file 7 is an integer file, which has an element size of 1 word, the server controller can address 3276 elements within this file.
- If file 8 is a floating point file, which has an element size of 2 words, the server controller can address 1638 elements within this file.

The offset specifies the starting element number in each PLC-5 file that the server controller addresses.

If multiple controllers are configured on the same channel to address the same PLC-5, the range of PLC-5 files that each controller addresses must be mutually exclusive. Define controllers to look at different file ranges and element coverage by setting the base file, number of files, and offset values appropriately.


Defining an Allen-Bradley address for a point parameter value

Entering an address

For **PV Source Address**, **Source Address**, and **Destination Address** the format for an Allen-Bradley controller address is:

ControllerName Location

Part	Description
<i>ControllerName</i>	The name of the Allen-Bradley controller.
<i>Location</i>	The location in the controller where the value is recorded. The syntax depends on the Allen-Bradley controller type: <ul style="list-style-type: none"> • “PLC, PLC-2, and PLC-3 addressing” on page 54 • “PLC-5 and SLC-500 direct logical addressing” on page 55

If you would like help when defining an address, click  next to **Address** to display Address Builder. For details, see the help.

PLC, PLC-2, and PLC-3 addressing

The location syntax is:

OctalWord [DataFormat]

Part	Description
<i>OctalWord</i>	Octal word address for the PLC. For example, the address for a point referencing octal word 16 would be 16.
<i>DataFormat</i>	(Optional) Data format. If you do not specify a data format, the default for PLC and PLC-2 points is U4095. See “Data format definitions” on page 61.

PLC-5 and SLC-500 direct logical addressing

The PLC-5 and SLC-500 have a structured address space and cannot be defined as a memory location. Direct logical addressing lets you identify a bit number, an element, or a data file. The address format varies depending on the type of address.



Note

Files of type Status require I/O addressing. For Status File addressing, see “Status file addressing” on page 61.

Location syntax for direct logical addressing:

xf: e. s/ b [DataFormat]

Part	Description	Go to:
<i>x</i>	File type identifier	page 55
<i>f</i>	File number	page 56
<i>e</i>	Element number	page 57
<i>s</i>	Sub-element mnemonic	page 57
<i>b</i>	Bit number	page 60
<i>DataFormat</i>	(optional) Data format. If you do not specify a data format, the default for: <ul style="list-style-type: none"> PLC-5 points is 0 (no data conversion or scaling) PLC-5 floating point file variables is IEEEFP (no scaling) 	page 61

Delimiters

The file elements are separated using special delimiters:

- Colon (:) separates file and element numbers.
- Period (.) is used only with sub-element mnemonics in counter, timer, and control file types.
- Slash (/) separates bit numbers from element or sub element numbers.

File types

File Type	Description
B	bit

File Type	Description
F	floating point (PLC-5 only)
N	integer
R	control
T	timer
DE	DE module
DEM	DE module (minimal)
C	counter
I	input
O	output
S	status
PD	PID

Default file numbers

File Number	Description
0	output
1	input
2	status
3	bit
4	timer
5	counter
6	control
7	integer
8	floating point
9 to 999	for additional file storage
3 to 999	for PID file type

For file type DE or DEM the file number value must be the number of the first of the three files used to store the information from the DE Module. The controller must be configured to be able to access these three files.

Element numbers

Element No.	Number Format	File Type
0 to 37	octal	for PLC-5 I/O files
0 to 999	decimal	for all other file types

For an address of file type DE or DEM, the element number must represent a DE or DEM module channel respectively.

Example

Element address:

- F8:58 (addresses an element in a floating point file—element 58 of floating point file 8)
- S:3 (addresses a word in a status file—element 3 of status file)

Sub-element mnemonic

Used with timer, counter, control, PD or DE/DEM file types. Word addresses in timer, counter, and control files use the period delimiter and mnemonic according to the file type.



Note

DE and DEM are available for PLC-5 but only DEM is available for SLC-500. For an explanation of DE and DEM file mnemonics and the parameters they represent, consult the ProSoft 3700 and 3750 DEM user manuals.

Example

Sub-element mnemonic address:

- DE30:3.PV (addresses the PV of the 4th transmitter connected to the DE module)
- T4:12.ACC (addresses a word in a timer file—accumulated value of timer 12 in file 4)

Mnemonics by file type

T file	C file	R file	PD file	DE file	DEM file
ACC	ACC	LEN	ADDR1	CfgCount	CfgCount
PRE	PRE	POS	ADDR2	CfgDbAvl	CfgDbAvl
EN	CU	EN	BIAS	CfgDbUpd	CfgDbUpd
TT	CD	EV	CA	CfgMode	CfgMode
DN	DN	DN	CL	ColdJunct	ColdJunct
	OV	EM	CT	ConfigMismatch	ConfigMismatch
	UN	ER	DB	Damping	Damping
		UL	DBNA	ErrCount	FnDone
		IN	DO	FnDone	FnPassed
		FD	DVDB	FnPassed	Freq
			DVN	Freq	Function
			DVP	Function	LRL
			DVPA	LRL	LRV
			EN	LRV	MisColdJunct
			ERR	MisColdJunct	MisDamping
			EWD	MisDamping	MisDeConf
			INI	MisDeConf	MisFreq
			KD	MisFreq	MisLRV
			KI	MisLRV	MisNumPVs
			KP	MisNumPVs	MisOpenTherm
			MAXI	MisOpenTherm	MisPVChar
			MAXO	MisPVChar	MisPVNum
			MAXS	MisPVNum	MisSensor
			MINI	MisSensor	MisTagId
			MINO	MisTagId	MisURL
			MINS	MisURL	MisURV
			MO	MisURV	Name
			OLH	Name	NumberPVs
			OLL	NumberPVs	OpenTherm
			OUT	OpenTherm	PV
			PE	PV	PVBadFlag
			PV	PVBadFlag	PVchar

T file	C file	R file	PD file	DE file	DEM file
			PVDB	PVchar	PVCount
			PVH	PVCount	PVNumber
			PVHA	PVNumber	PVoutput
			PVL	PVoutput	Pvupdate
			PVLA	Pvupdate	Sensor
			PVT	RawPV	SpecialDB
			SO	Sensor	Status1
			SP	sfc_det	Status2
			SPOR	SpecialDB	Status3
			SWM	Status1	SV
			TIE	Status2	Svupdate
			UPD	Status3	URL
				SV	URV
				SVCount	
				Svupdate	
				URL	
				URV	

Bit numbers

Bit Number	Format	File Type
0 to 17	octal	I/O files
0 to 15	decimal	All file types other than I/O, including status
0 to 15, 999	decimal	(Optional) For bit type files when not specifying the element number



Note

Bit addresses in timer, counter, or control files access only particular bit numbers or mnemonics. See “Bit numbers for timer, counter, or control addresses” on page 60.

Example

Bit address:

- N7:64/00 (bit address in integer file 7, element 64, bit 0)
- B3:15/5 (bit address for bit 5, in word 15, of file number 3)
- I:02/10 (I/O status bit for input file, word 2, bit 10 octal)

Bit numbers for timer, counter, or control addresses



Note

Do not use any other bit numbers or mnemonics for timer, counter, or control addresses.

Bit No	Timer	Counter	Control
15	EN (enable)	CU (up enable)	EN (enable)
14	TT (timing)	DC (down enable)	EU (unload enable)
13	DN (done)	DN (done)	DN (done)
12	-	OV (overflow)	EM (empty)
11	-	UN (underflow)	ER (error)
10	-	-	UN (unload)
09	-	-	IN (inhibit)
08	-	-	FD (found)

Example

When using the general location syntax *xf.e.b* or *xf.e/b*

- C5:8.CU and C5:8/15 are the same address.
- C5:8.ACC/00 is a legitimate address.

Status file addressing

The format for status files addressing differs from the general format.

To address a status file:

- Location syntax for addressing a word:
S:e [DataFormat]
- Location syntax for addressing a bit:
S:e/b [DataFormat]

Part	Description
<i>S</i>	status
<i>e</i>	element number
<i>b</i>	bit number (0 to 15)
DataFormat	Data format

Data format definitions

Enter a format if you do not want to use the default format. The data format you select will depend what you want to do with the value:

- To scale
- To read raw value
- To configure a mode (2-bit integer or PD file only)

If you want to use a user-defined data format, you must define the format on the server. See the *Configuration Guide* for details.

To scale

U and S range data format types are scaled by the point range values.

Format	Counts
U3BCD	0 to 999 BCD
U4BCD	0 to 9999 BCD
U6BCD acquisition only	0 to 999999
U8BCD	0 to 99999999
UBCD12	0 to 409 BCD
UBCD16	0 to 4095 BCD
U4095	0 to 4095
U999	0 to 999

Format	Counts
U9998	0 to 9998
U9999	0 to 9999
U100	0 to 100
U1023	0 to 1023
S16B	-32768 to 32767
S8B	-128 to 127
S9999	-9999 to 9999
U8B	0 to 255
U14B	0 to 16383
U15B	0 to 32767
U16B	0 to 65535
U32B	0 to 4294967296
SLC_AI	3277 to 16384
SLC_AO	6242 to 31208

Formats and unreasonable limit alarms

The Allen-Bradley scan task masks data, hence there is no overflow or underflow. for example, if you use U4095 and the value is 4098, it shows up as 3 in the server. This implies that no unreasonable limit alarms will be generated for Allen-Bradley points.

To read raw value

Enter **IEEEFP** to read IEEE single precision floating point.

Enter **0** to read 16 bits (that is a number from 0 to 65535).

If no scaling is done, the point range values are used for PV indicator display height only on the Point display.

To configure a mode (2-bit integer or PD file only)

Enter **MODE** to configure a mode for a mode parameter (MD) source or destination address.

For an integer file (N) address, 2 bits are accessed with the following meaning:

- 00 (Man)
- 01 (Auto)
- 10 (Case)

For a PD file address, a single bit is accessed with the following meaning:

- 1 (Auto)
- 0 (Man)

Logix5550 addressing

File Type	Description
N	integer (16-bit)
DN	double integer (32-bit)
F	floating point (32-bit)

**Note**

Bit level addressing is only supported for the N file type.

Modifying a channel or controller after download

You cannot modify the Allen-Bradley controller or channel after you have downloaded them.

To modify a controller or channel after you have downloaded it:

- 1 If necessary, make a record of the current settings for the controller/channel.
- 2 Delete the controller/channel.
- 3 Download the project so that the controller/channel is deleted in the server database.
- 4 Add a new controller/channel, redefining the settings as required.

Optimizing Allen-Bradley scan packets

An Allen-Bradley DH or DH+ scan packet can consist of up to 122 16-bit words. A DH485 packet can consist of up to 45 16-bit words.

An Allen-Bradley scan packet can be located anywhere along the full address range of the controller.

Two types of scan packets are built for an Allen-Bradley interface:

- Hardware diagnostic scan
- Periodic data acquisition scan



Note

The server accepts unsolicited data from both PLC-5 and PLC-2.

To achieve satisfactory system performance, three configuration strategies are recommended:

- Lower scanning rates using unsolicited data
- Database organization
- Additional channels

Lower scanning rates using unsolicited data

Besides normal periodic data acquisition, the server accepts unsolicited data from PLC-5 and PLC-2 devices. By taking advantage of unsolicited data, you can reduce the rate of periodic scanning required. Unsolicited messages can be used for slow moving data and to notify of sudden changes in critical values.

When the server receives an unsolicited message, all point parameters referencing the address of the value contained in the message are updated with the new value. The data must be received as per normal Allen-Bradley message protocol. The application-layer message commands accepted by the server are:

- Typed write—valid for PLC-5 type devices
- Unprotected write—valid for PLC-2 type devices (or other devices in compatibility mode)
- Protected write—valid for PLC-2 type devices (or other devices in compatibility mode)

See Allen-Bradley programming manuals (for the relevant PLC type) for details on how to send unsolicited messages from the PLC. The *Installation Guide* describes how to configure unsolicited messages for a PLC-5. Additional information about configuring both PLC-2s and PLC-5 for unsolicited messages

can be found in the *Allen-Bradley Programming Software Instruction Set Reference Manual* for the relevant PLC.

If using RSLinx, in order to receive unsolicited messages in a timely fashion you need to configure the RSLinx service to start when the server is switched on. That is, the service should be made automatic. Otherwise, if RSLinx is started as a foreground application it might slow message transfer from the PLC to the server scanning subsystem.

Database organization

The PLC database should be arranged so that the maximum number of points of the same scan frequency are packed together in discrete areas of PLC memory. In this way a block of words can be read quickly as the space available is maximized.

By organizing the database in a more efficient fashion, overall system performance can be enhanced.

Additional channels

Some systems can have more than one link to the Allen-Bradley Data Highway. This helps to alleviate any I/O bottlenecks that might occur on a single 1770-KF2 module.

If PLC-3 processors are being accessed through more than one 1770-KF2, compatibility files will have to be taken into consideration. A separate compatibility file must be used for the second and each subsequent 1770-KF2. See PLC-2 compatibility file.

PLC-2 compatibility file

A file that mimics the flat address space of the PLC/PLC-2.

The server can only interface with a PLC-3 through compatibility files. If a PLC-3 detects PLC/PLC-2 protocol for incoming messages, it operates through a compatibility file, mimicking the PLC/PLC-2 main memory, and returning responses using PLC/PLC-2 protocol.

The PLC-3 scrutinizes the incoming message and determines which station it has come from. Each message contains the ID of the originating station. Based on the station ID, the PLC-3 determines which compatibility file to use. For example, if the server request message originated through a 1770-KF2 module with octal station ID 30 then, for a PLC-3 input file, octal number 30 is used, giving the address I30.

If a PLC-3 is accessed through more than one 1770-KF2, a separate compatibility file must be used for the second and each subsequent 1770-KF2.

When using compatibility files, the PLC-3 software must map the file contents to and from the real I/O. You can configure your system in different ways depending on how much data is being transmitted and how much data space is needed.

Consult the Allen-Bradley programming documentation for the PLC-3 before creating compatibility files.

Server and Station tasks for Allen-Bradley

4

This chapter describes tasks for the Allen-Bradley controller that you perform either on the server or from any Station.

For:	Go to:
Testing communications with the server	page 70
Troubleshooting communication errors	page 72
Defining points using Allen-Bradley software	page 73
Troubleshooting point addressing errors	page 80
Viewing status data without points	page 81
Viewing PID file configuration	page 82
Automatic status fault alarming	page 82
Viewing and modifying smart transmitter variables	page 84

Testing communications with the server

Use the Allen-Bradley test utility, **abrtst**, to test communications between the server and the PLCs and SLCs after you have downloaded your channel and controller definitions to the server database.

Before testing:

- Set up PLCs or SLCs and CIM (if required)
- Connect all cables
- Enter definitions for controller and channel in Quick Builder project file
- Downloaded project file definitions to server without errors

If there is a PLC or SLC Programming Terminal with the system, it should be used to ensure that the PLC or SLC is operating correctly.

To run the test utility:

- 1 Type **abrtst** and press <Enter>.
- 2 Type the controller number you want to communicate with. In Quick Builder, the controller number is displayed at the bottom of the Main property display for the controller.
- 3 Type in a command.
For a list of possible commands and their syntax, type **?** and press <Enter>.

See Example entries while running abrtst.

Example entries while running abrtst

Sample test for communicating with a PLC-5. User entries are in boldface type.

abrtst

Enter the controller number

3

Enter command:

?

Address has the form Ff:e/s

where: F - file type

f - file number

e - element number

s - sub-element number

READ a,n,p - read address a for n, p passes

WRITE a,n,d,p - write address a for n, data d, p passes

BITWRITE a,b,s,p- write address a bit b, set(0,1), p passes

FIND i - find plc with id i or greater (for PLCs on DH/DH+ only)

DELAY n - set delay between passes to n ms
FORMAT f - display data in format f (HEX, DEC, or FLOAT)
FO filename- direct output to file
! - execute last command
Q - quit
Enter command:

read n10:5,2,1

READ id= 3 address N10:5 for 2 words
Data (Decimal format)
57 60
Enter command:

q

Troubleshooting Allen-Bradley communication errors

Check the server log file for errors.

C302 - Remote node does not acknowledge message

Possible cause:

- PLC does not exist on DH/DH+.
- PLC disconnected.
- PLC not powered on or not functioning.

Remedy:

Verify that the ID defined for the PLC is correct.

Ensure that the PLC is on the DH/DH+ and is functioning.

C507 - File is wrong size

Possible cause:

Point(s) addressing a non-existent element in a file.

Remedy:

Check the PLC-5 or SLC-500 memory map for file sizes.

Check point address definitions for a mismatch.

Transaction Timeouts occur in log file

Possible cause:

The read timeout value is too low. Read timeout is the timeout between a request being made for data, and the request coming back to the PLC.

Remedy:

Specify a greater read timeout value for the channel.

Defining points using Allen-Bradley 6200 software

Use the **abpnt** utility to create a point definition file (pntb1d) from an Allen-Bradley 6200 ASCII symbol file.

Allen-Bradley point build utility abpnt

The **abpnt** utility converts the ASCII symbol file into a point definition (also called pntbld) file. Point definition files can be imported into Quick Builder for additional configuration, such as algorithms.

Generating a symbol file

When generating the Allen-Bradley symbol file, **pntbld** commands can be embedded into the comment field for each symbol. In a similar fashion, the point ID for an Allen-Bradley PLC address can be specified in the comment field.

There are two steps involved in creating an Allen-Bradley symbol file:

- 1 Assigning a symbol (or name) to each PLC address of interest. For each symbol, an optional comment can be specified.
- 2 Exporting the symbol information to an ASCII file.

Assigning a symbol to an address

All addresses in the Allen-Bradley PLC that are to be monitored by the server need to have a scan point defined for that address. To do this, the address is assigned a symbol.

From the main menu of the Allen-Bradley loader program, follow the menu choices below to create a symbol:

- 1 Select **Online Program**.
- 2 Select **Monitor File**.
- 3 Select **Documnt**.
- 4 Move the pointer to position it above the appropriate address and select **Modify Symbol**.
- 5 When prompted, type in the symbol name that you want to assign to this address and then press <Enter>.
- 6 If you want to add a comment, select **Address Comment** and enter the desired comment. See “Comment field syntax” on page 74, for details on the comment format.
- 7 Repeat the above steps for each address.

Alternatively:

- 1 Select **Documnt > Edit DBASE** and type the PLC address when prompted.
- 2 Press <F6> (Modify Symbol).
- 3 Type the symbol name that you want to assign to the address, and then press <Enter>.
- 4 Press <Esc> to accept this entry.
- 5 You can also type an Address Comment. This provides a convenient method for embedding point build information. The format of the comment field is described in “Comment field syntax” on page 74.

For further information, see the section titled “Entering Symbols” in the Allen-Bradley Programming Manual called *Documenting Ladder Programs*.

Comment field syntax

Symbols defined in the Allen-Bradley loader software can have a comment assigned to them. Within the comment, point build information can be embedded. If no comment is provided, the symbol name will be taken as the point ID within.



Note

The inverted commas shown around a comment are automatically inserted when exporting a symbol file and must not be included when specifying a comment in the Allen-Bradley loader.

“PointID!EmbeddedCommands;PointComment”

Part	Description
<i>PointID</i>	The symbol’s point ID. A string of up to 16 characters that must contain at least one alphabetic character and cannot contain any spaces, tabs, commas, exclamation marks, commas, or inverted commas. The point name is delimited with the exclamation mark (!) character.

Part	Description
<i>EmbeddedCommands</i>	<p>A list of comma-separated pntbld source or destination commands. It is delimited with a semicolon (;) and no spaces should occur within the field.</p> <p>The syntax is: $xx yyD$ where: xx is PV, MD, OP, SP, A1, A2, A3 or A4. (This denotes the source for the particular point parameter.) yyD is MDD, OPD, SPD, A1D, A2D, A3D or A4D. (This denotes the destination for the particular point parameter.)</p>
<i>PointComment</i>	An optional field that the user can include to provide information about the point. The entire comment field must not exceed 50 characters in length.

Example	<p>“tank2inflow!PV,OP,OPD Tank 2 inlet flow rate”- All types of info present</p> <p>“temp2gauge!A1,MDD” - No comment given</p> <p>“vat7level!;vat 7 tank level” - No embedded commands</p> <p>“!A1,SPD;A1 output flow rate” - No point name</p> <p>“Meltdown alarm” - Comment only</p>
----------------	--

Exporting the symbol file

The list of symbols, their associated address, and any comments can be exported to a symbol file as follows.

- 1 From the main menu of the loader select **File Utils**.
- 2 Select **Export**.
- 3 Select **Comments Symbols**.
- 4 Select **Select Source** and then select the PLC.
- 5 Select **Select Data** and ensure that “Symbols” and “Address Comments” are selected.
- 6 Click **Save Config** if you made changes.
- 7 Select **Enter Destin** and then type the destination file name.
- 8 Select **Begin Oper**.

The default target folder for the exported file is c:\IPDS\TEXT\PLC5, but this can be redefined by the user. The file will have the extension .txt.

You then need to transfer the symbol file to the server. This can be done via FTP or by floppy disk.



Note

If the symbol file was originally exported from ICOM WinLogic configuration software, then it needs to be converted to the Allen-Bradley 6200 configuration software format before running **abpnt**.

Once the symbol file has been created, the **abpnt** utility can be run on this file to create a point definition file.

abpnt command syntax

The **abpnt** utility is run from the command line and has several options.

```
abpnt [-t TemplateFile] [-r rrr] [-a nnnnn] [-s nnnnn] SymbolFile
OPFile
```

Part	Description
<i>TemplateFile</i>	Name of the file that contains a template of point definition entries that should be automatically included for each point type. Further information is given below. A path should be specified if the template file does not exist in the current working folder. The combined path and file name must not exceed 100 characters.
<i>rrr</i>	Controller number to assign to point entries in the output file. This defaults to 001 if this option is not specified. The controller number must not be longer than 3 digits.
<i>nnnnn</i>	Starting reference number to use for analog (ANA) or status (STA) points. For example, if the command line option “-a 123” is given, the first analog point encountered will be assigned ANA00123 and this value will be progressively incremented for each following analog point. The default is 00001. The starting reference number must not be longer than 5 digits.
<i>SymbolFile</i>	Input ASCII file. Specify the full path name if the ASCII file is not in the current working folder. The combined path and file name must not exceed 100 characters.
<i>OPFile</i>	Output pointbuild file. If the output file already exists, a warning message is generated and the user is asked if they wish to overwrite the existing file or not. If you overwrite the file, all existing entries are lost. Otherwise, the output file is not changed and the program exits without processing the ASCII symbol file. The path and file name are restricted to 100 characters.

Template file

An **abpnt** template can be created to define pointbuild information that will be included for every point of each point type. The template file contains two types of entries—point type key and point definition.

Example	<pre>#COMMON HISTORY SLOW EXTD FAST #ANALOG DRIFTDB 6 CNTRLDB 0 #STATUS OPWIDTH 1 STATEDES OFF ON</pre>
----------------	---

Point type key

#COMMON, #ANALOG, and #STATUS are the point type keys. All point definition entries that follow apply to this point type until another point type key is encountered. The keys are:

#COMMON

Indicates that the point definition entries will apply for all point types.

#ANALOG

Indicates that the point definition entries will only apply for the analog point type.

#STATUS

Indicates that the point definition entries will only apply for the status point type.

The point definition entries are the same as listed in the *Hardware and Point Build Reference*.



Note

- Do not include the POINT_ID field, as abpnt will automatically include this information.
 - Do not include the DEL and ADD commands as they are automatically included in each point build definition,
 - The xxDESTIN and xxSOURCE commands can be specified in the embedded symbol comment field (see above).
-

Example	<p>The following provides an abpnt example of a template file, ASCII symbol file and the corresponding output obtained when these are passed through abpnt.</p>
----------------	---

The command line arguments used were:

```
abpnt -t tmp1.file -a 5 -s 7 -r 123 symbol.file op.file
```

The template file (tmp1.file) was the same as above:

```
#COMMON
HISTORY SLOW EXT D FAST
#ANALOG
DRIFTDB 6
CNTRLDB 0
#STATUS
OPWIDTH 1
STATEDES OFF ON
```

The input ASCII file (symbol.file) was:

```
%WIDTH 10 ! %WIDTH (instr. comm. width and symbol size) must be
between 10 and 20. Default is 10.
SYM S:125 STATUS125
AC %LEFT %WRAP S:125 "STAWrdNam!PV,MDD,A1,A1D;Init pt"
SYM S:127/0 STATUS127
AC %LEFT %WRAP S:127/0 "STABitName!OPD,A4D;Final status pnt"
SYM B3:20 BIT20
AC %LEFT %WRAP B3:20 "BitwrdrName!PV,OPD;Bit word 20"
SYM B10/655 BIT40
AC %LEFT %WRAP B10/655 "No embedded info "
SYM T4:20.ACC TIMER20A
AC %LEFT %WRAP T4:20.ACC "TimerACC!A1"
SYM T4:20.DN TIMER20E
AC %LEFT %WRAP T4:20.DN "TimerDN!MD;Time done signal"
SYM T4:20.EN TIMER20C
AC %LEFT %WRAP T4:20.EN "!PV;No point name"
SYM T4:20.PRE TIMER20B
AC %LEFT %WRAP T4:20.PRE "TimerPRE!"
SYM T4:20.TT TIMER20D
AC %LEFT %WRAP T4:20.TT "TimerTT!OPD;Timer TT"
```

The following shows the resultant point source file when the above example template file was used with the above ASCII file:

```
DEL STAWrdName
ADD STAWrdName ANA00005 Initial status pt
PVSOURCE STAWrdName 123 S:125
A1SOURCE STAWrdName 123 S:125
MDDESTIN STAWrdName 123 S:125
A1DESTIN STAWrdName 123 S:125
DRIFTDB STAWrdName 6
CNTRLDB STAWrdName 0
HISTORY STAWrdName SLOW EXT D FAST
DEL STABitName
ADD STABitName STA00007 Final status pnt
OPDESTIN STABitName 123 S:127/0
A4DESTIN STABitName 123 S:127/0
OPWIDTH STABitName 1
```

```
STATEDES STABitName OFF ON
HISTORY STABitName SLOW EXTD FAST
DEL BitWrName
ADD BitWrName ANA00006 Bit word 20
PVSOURCE BitWrName 123 B3:20
OPDESTIN BitWrName 123 B3:20
DRIFTDB BitWrName 6
CNTRLDB BitWrName 0
HISTORY BitWrName SLOW EXTD FAST
DEL BIT40
ADD BIT40 STA00008 No embedded info
OPWIDTH BIT40 1
STATEDES BIT40 OFF ON
HISTORY BIT40 SLOW EXTD FAST
DEL TimerACC
ADD TimerACC ANA00007
ALSOURCE TimerACC 123 T4:20.ACC
DRIFTDB TimerACC 6
CNTRLDB TimerACC 0
HISTORY TimerACC SLOW EXTD FAST
ADD TimerDN STA00009 Time done signal
MDSOURCE TimerDN 123 T4:20.DN
OPWIDTH TimerDN 1
STATEDES TimerDN OFF ON
HISTORY TimerDN SLOW EXTD FAST
DEL TIMER20C
ADD TIMER20C STA00010 No point name
PVSOURCE TIMER20C 123 T4:20.EN
OPWIDTH TIMER20C 1
STATEDES TIMER20C OFF ON
HISTORY TIMER20C SLOW EXTD FAST
DEL TimerPRE
ADD TimerPRE ANA00008
DRIFTDB TimerPRE 6
CNTRLDB TimerPRE 0
HISTORY TimerPRE SLOW EXTD FAST
DEL TimerTT
ADD TimerTT STA00011 Timer TT
OPDESTIN TimerTT 123 T4:20.TT
OPWIDTH TimerTT 1
STATEDES TimerTT OFF ON
HISTORY TimerTT SLOW EXTD FAST
```

Troubleshooting point address errors

The following error codes apply specifically to Allen-Bradley.

8641

Verify that the data format (for a given file type) is a valid format.

C400 - Invalid A-B Address specification

Verify that your PLC-2 type address is in octal.

C401 - Invalid A-B number string

Verify that the correct decimal file number string follows file type.

C403 - Invalid A-B Bit number string

Verify that you have specified the bit number correctly (octal in I/O files and decimal for others).

C404 - Invalid A-B file number

Verify that the file number is within the file number range specified for the controller.

C405 - A-B file type redefinition

You have used the same file number previously, for a different file type. Deleting a point will not reset the file type specification of a file. It is necessary to delete the controller and add it again.

C406 - A-B file word address overflow

Your file word address has exceeded the maximum allowed address space for a file in the controller.

C407 - Invalid A-B element number

Verify that you have specified the element number correctly (octal for I/O files, decimal for others).

C408 - A-B Element number missing

You must specify an element number in the file for every address.

Viewing status data for PLC-5 and SLC-500 without configuring points

Without the need for any points to be defined, the server can read and display system status information for a configured PLC-5 or SLC-500 controller provided that the status file for the controller is within the address range of the server.

Status data belongs to a subset of the PLC-5 or SLC-500 processor status data held in the respective PLC-5 or SLC-500 status file and includes:

- Processor status and flags
- Major fault bits
- Fault code (for PLC-5 only)
- Minor fault bits
- Rack fault and rack queue full bits (for PLC-5 only)

To view status data:

- 1 Run Station and either double-click the controller name or select the controller name and then click the Detail tool. A Configuration Menu for the controller is displayed.
- 2 Click the status menu item you want to view.

Viewing PD file configuration

For each PD file to be scanned by the server, a single point referencing a single element is required.

Example

If a PLC-5 has a PD file within its addressing range with file number 12, to build a point to reference this file, the PV source address location would be PD12:0.PV.

To display the PD file configuration information at a Station:

- 1 From the Controller Reference Summary display on Station, either double-click the PLC-5 controller name, or select PLC05 controller name and go to the Station Tool bar and click the Details tool. The Controller Configuration display appears showing the PLC-5 configuration menu.
- 2 Select the PD file you want to view.

Alternatively:

Call up the Point Detail display on Station for the PV of the PD file, then double-click the PV.

Use the Controller Configuration display for the PD file to configure parameters in the PD file element. Note that while the PLC is in RUN mode, the following parameter cannot be changed:

- PID equation
- Maximum and minimum scaling
- Derivative action

If faults are detected in more than one fault category, only one alarm is raised for the highest priority fault category, a lower priority fault alarm being replaced by a higher priority fault alarm in the next scan.

For this feature to be active, at least one controller must be built which includes the Allen-Bradley status file (file 2) in its range.

To find specific faults, see “Viewing status data for PLC-5 and SLC-500 without configuring points” on page 81.

Automatic status fault alarming

Without the need for any points to be built, the server can generate status fault alarms for every configured PLC-5 and SLC-500 controller that has the respective PLC-5 or SLC-500 status file within its addressing range.

To find specific faults, see “Viewing status data for PLC-5 and SLC-500 without configuring points” on page 81.

Alarming for PLC-5 and SLC-500

The server periodically scans the PLC-5 for major and minor rack faults. The diagnostic scan period is 60 seconds.

If faults are detected in more than one fault category, only one alarm is raised per category. Also on the Controller Status page in Station, the word “MAJ”, “MIN”, or “RACK” indicating major, minor or rack fault respectively, is shown as the controller status.

For this feature to be active, at least one controller must be built which includes the Allen-Bradley status file (file 2) in its range.

Alarming for SLC-500

The server periodically scans the SLC-500 for major and minor rack faults. The diagnostic scan period is 60 seconds.

Viewing and modifying smart transmitter variables

Using either the ProSoft DE Module (3700 DEM) or ProSoft DE Module (3750 DEM), you can monitor the value of Honeywell Smart transmitter variables and configure their writable parameters.

For information about communications settings for the ProSoft 3700 or 3750 DEM, see the *Prosoft 3700/3750-DE User's Manual*.

To View

There are three ways to view the DE/DEM parameters:

- From the Station Controller Summary display, double-click the name of the controller.
- From the Station Controller Status Details display, double-click the controller name.
- From a Station Point Detail display, double-click the point parameter that references a DE/DEM parameter.

The Controller Configuration display will appear for the selected controller.



Note

The update rate of the Controller Configuration display is, by default, every five minutes. You can force an update by pressing the <Esc> key. Values are also updated when you modify any value using this display.

To Navigate

Tool	Description
<Page Up> key	Displays previous DE/DEM channel for same DE/DEM module.
<Page Down> key	Displays next DE/DEM channel for same DE/DEM module.
scroll bar Up button	Scrolls up one parameter.
scroll bar Down button	Scrolls down one parameter.

To modify a value

Type a new value in any field that is writable (Tag Name, for example).

This will create a mismatch condition that is reflected by the display. Both the current value in the transmitter and the new value are displayed.

**Note**

Downloading downloads all values for the transmitter, not just the last changed value. To avoid changing more than the values you have just modified, always perform an upload of the transmitter data before you attempt any modifications. This will ensure that the only values changed in the transmitter data when you download are those you changed after the upload.

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Applicom Interface Reference

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Getting started

1

This reference provides the information you need to set up, configure, and test an Applicom system.

Steps for connecting and configuring an Applicom.

Complete each step before commencing the next step.

Step:	Go to:
Set up Applicom card	page 9
Define channels using Quick Builder	page 12
Define controllers using Quick Builder	page 14
Download channel and controller definitions to the server	
Test communications	page 20
Define controller points using Quick Builder	page 16

Support and documentation for Applicom

For information about supported devices and related documentation, see the *Software Change Notice* or the *Software Release Bulletin*.

Applicom setup

2

This chapter describes how to set up an Applicom.

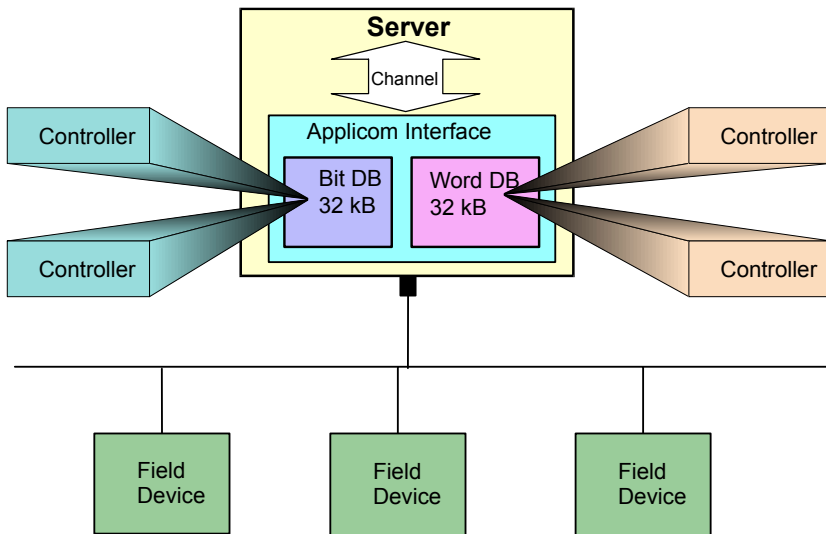
The tasks for setting up an Applicom are:

For:	Go to:
Supported architecture	page 8
Setting up an Applicom Communication Server card	page 9
Set up communications indicator	page 10

Architecture for Applicom

The term *Applicom Communication Server card* refers to all supported Applicom Communication Server cards. The cards come in a range of configurations, and are installed in the server.

The Applicom can handle up to eight Applicom Communication Server cards, and interacts with the card databases as shown in the following figure.



You need to define each Applicom Communication Server card as a channel, and each part of the associated databases as a controller.

Setting up an Applicom Communication Server card

The interface between the server and an Applicom Communication Server card is achieved by installing the software drivers supplied with the card.

To set up a card:

- 1 Create the “Applicom” folder anywhere on the system.
- 2 Add the Applicom folder to the System Path.
- 3 Install the Applicom software drivers supplied with the card in the Applicom folder.
- 4 Check that `applicom.dll` is in the Applicom folder.
- 5 Install the card, with a suitable interrupt.
- 6 Set the server’s CMOS in accordance with the selected interrupt.
- 7 Add the Applicom device to Control Panel Devices.
- 8 Run `pcinisrv` to ensure that the card is initialized by the `pcinit` service at system startup.

Cabling and device configuration

Cabling from the Applicom Communication Server cards to the field devices is described in the *APPLICOM Communication Server Manual*. The manual also describes the methods by which the data from field devices is stored in the Applicom databases.

Monitoring field devices

The server only reads data from the Applicom Database, not directly from the field devices attached to the Applicom Communication Server Card. This means that it is possible for the server to remain unaware of a loss of communications with a field device.

To overcome this:

- 1 Allocate a word in the Applicom Word Database as a “communications indicator”.
- 2 Configure the field device to update this word at a regular interval—less than 60 seconds. (You can do this even if the controller addresses the Bit Table, because the diagnostic address resides in the Applicom Word Database.)
You configure the field device using the external utility supplied with the Applicom Communication Server Card (see *APPLICOM Communication Server Manual*).
- 3 When you configure the Applicom controller in Quick Builder, specify this word in **Diagnostic Address**. See “Applicom controller Main properties” on page 14.

The Applicom Interface checks this address as part of its diagnostic request every 60 seconds, and compares the current value with the previous value. If the value has not changed after a number of retries, the controller is deemed to have failed under the standard controller failure algorithm, and all associated point data is set to “bad” status. The Applicom Interface continues to read this address, so that when the value does change—indicating that communications has been restored—the controller can be automatically recovered.

Applicom configuration and addressing


3

This chapter describes how to configure an Applicom using Quick Builder.

For information about:	Go to:
Defining an Applicom channel	page 12
Defining an Applicom controller	page 14
Defining an address for a point parameter value	page 16
Optimizing scanning performance	page 18

Defining an Applicom channel

To define a channel:

- 1 Click  to display the Add Items dialog.
- 2 Select Channel as the item and Applicom as the type.
- 3 Set the property values on the Main tab—see Applicom channel Main properties.

Applicom channel Main properties


The Main tab defines the basic properties for an Applicom channel.

Property	Description
Name	The unique name of the channel. A maximum of 10 alphanumeric characters (no spaces, underscores or double quotes).
Description (optional)	A description of the channel. A maximum of 30 alphanumeric characters, including spaces.
Marginal Alarm Limit	<p>The communications alarm limit at which the channel is declared to be marginal. When this limit is reached, a high priority alarm is generated. This limit is the channel barometer, which monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer is incremented by 2 or more, depending on the error and decremented for each good call.</p> <p>To calculate an acceptable limit, multiply the square root of the number of controllers on the channel with the controllers' Marginal Alarm Limit (generally, you specify the same value for all controllers on a particular channel). For example, if there are 9 controllers, and you have set the controllers' Marginal Alarm Limit to 10, the value would be $\pm 9 \times 10$ (that is, 30).</p>
Fail Alarm Limit	<p>The communications alarm limit at which the channel is declared to have failed. When this barometer limit is reached, an urgent alarm is generated.</p> <p>Set this to double the value specified in Marginal Alarm Limit.</p>
Card Number	The card's ID in the server. A number between 1 and 8.

Property	Description
Connect Timeout	The time, in seconds, the server attempts to connect to the Station before giving up. The default value is 10 seconds.
Read Timeout	The time, in seconds, the server attempts to read data from the Station before giving up. The default value is 2 seconds.
Item Type	Shows the type of item specified when this item was created.
Last Modified	Shows the date of the most recent modification to this channel's property details.
Item Number	The unique item number currently assigned to this item. You can change the item number if you need to match your current server database configuration. The number must be between 1 and the maximum number of channels allowed for your system.

Defining an Applicom controller

To define a controller:

- 1 Click  to display the Add Items dialog.
- 2 Select controller as the item and Applicom as the type.
- 3 Set the property values on the Main tab. See “Applicom controller Main properties” on page 14.

Applicom controller Main properties

The Main tab defines the basic properties for an Applicom controller.

Property	Description
Name	The unique name of the controller. A maximum of 10 alphanumeric characters (no spaces, underscores or double quotes).
Description (optional)	A description of the controller. A maximum of 30 alphanumeric characters, including spaces.
Channel Name	The Applicom channel on which the controller communicates with the server.
Marginal Alarm Limit	The communications alarm marginal limit at which the controller is declared to be marginal. When this limit is reached, a high priority alarm is generated. This limit is the controller barometer, which monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer is incremented by 2 or more, depending on the error and decremented for each good call. The default value is 25.
Fail Alarm Limit	The communications alarm fail limit at which the controller is declared to have failed. When this barometer limit is reached, an urgent alarm is generated. Set this to double the value specified in Marginal Alarm Limit .

Property	Description
Controller Type	<p>The type of controller:</p> <ul style="list-style-type: none"> • word Table. Addresses the Applicom word database. • Bit Table. Address the Applicom bit database. Only status points can address this controller. <p>Note: You can only build Analog and Accumulator points on word Table controllers.</p>
Offset	<p>For a Bit Table controller, the offset is the starting bit number address in the 32K bit database of the Applicom Communication Server Card. All bit numbers in the range 0 to 32767 are valid.</p> <p>For a word Table controller, the offset is the starting word number address in the 32K word database of the Applicom Communication Server Card. All word numbers in the range 0 to 32767 are valid.</p> <p>After defining the offset, the controller can address the maximum number of either consecutive bits (8192) or consecutive words (8192) depending on the controller type. For example, an offset of 10 for a word Table controller specifies that the controller can be used to address words 10 to 8201 in the Applicom word database.</p>
Diagnostic Address	<p>The address in the Applicom word database that is written to by the field device to indicate that the communications link is working. See “Monitoring field devices” on page 10.</p>
Item Type	<p>Shows the type of item specified when this item was created.</p>
Last Modified	<p>Shows the date of the most recent modification to this controller’s property details.</p>
Item Number	<p>The unique item number currently assigned to this item. You can change the item number if you need to match your current server database configuration. The number must be between 1 and the maximum number of channels allowed for your system.</p>


Defining an Applicom address for a point parameter

Entering an address

For **PV Source Address**, **Source Address**, and **Destination Address** the format for an Applicom controller address is:

ControllerName Location

Part	Description
<i>ControllerName</i>	The name of the Applicom controller.
<i>Location</i>	The address within the controller where the value is stored. For more details see “Location syntax” on page 16.

If you would like help when defining an address, click  next to **Address** to display Address Builder. For details, see the help.

Location syntax

The format for the location is:

Address [DataFormat] [BitNumber [MODE]]

Part	Description
<i>Address</i>	The byte to read from the field device. This address is the absolute address in the range 0 to 32767, not an address relative to the controller offset.
<i>DataFormat</i>	Applicable to an analog point. See “Data formats” on page 17.
<i>BitNumber</i>	Only applicable to status points defined in the word table. The valid range is 0 (default) to 15, where 0 is the right most bit in the register.
MODE	Only applicable to the MD parameter. Controls the bit width. If you specify MODE, the mode is 3-bit; if you don’t, the mode defaults to 1-bit.

Data formats

The data format is valid only for Analog and Accumulator points. The formats are shown in the following table.

Data Format	Description	Counts	Scaled
C16	16-bit, signed. This is the default format.	-32767 to 32768	No
IEEEFP	Single-precision floating point. Only applicable to analog points		No
S16B	16-bit, signed	-32767 to 32768	Yes
U16B	16-bit, unsigned	0 to 65535	Yes

“S” and “U” range format types are scaled by the 0% and 100% of the HOST range values. “C” types are not scaled and the 0% and 100% range values are used for adjusting the height of the display bar only.

Example

The following example is for a 16-bit signed value read from address 2048.

```
2048 c16
```

The following example is for a status value (for a status point) starting at bit address 1000. The width is indicated by the input or output width.

```
1000
```

The following example is for a 1-bit MD parameter value, starting at bit 2 of word address 2000.

```
2000 2
```

The following example is for a 3-bit MD parameter value, starting at bit 0 of word address 2000.

```
2000 MODE
```

Optimizing scanning performance

An Applicom scan packet can consist of up to 2033 bits (for a Bit Table controller) and 128 16-bit words (for a Word Table controller). The scan packet may be located anywhere along the full address range of the controller.

In order to be in a scan packet, within the block, points must reside in the one controller and have the same scan period. In addition, they must be addressed within the 2033-bit or 128-word range that defines the block. Blocks may contain status, accumulator and analog points.

Try to make each packet as close to the maximum size possible. Ensure there are no small packets being scanned at fast rates.

If more than one parameter references the same address in a controller, only one scan packet entry is created. If the parameters do not have the same scan rate, the scan entry will be created for the fastest scan rates for those parameters.

You can verify your scanning strategy by using the List Scan utility, **lisscn**, to list the scan packets you have built.

Two types of scan packets are built for the Applicom:

- **Hardware Diagnostic.** One scan per controller every 60 seconds for automatic recovery from communications failure with the controller.
- **Periodic data acquisition scan.** One per scan packet.

Server tasks for Applicom

4

This chapter describes tasks for the Applicom that you perform either on the server or from any Station.

For information about:	Go to:
Testing communications with field devices	page 20
Troubleshooting point configuration errors	page 21

Testing Applicom to field device communications

You use the diagnostic utility, **apptst**, to test communications between the Applicom and Applicom Communication Server cards.



Note

The server does not need to be running while using this utility.

To run the utility:

- 1 Open a Command Prompt window.
- 2 Type **apptst** and press <Enter>. Entries are self-explanatory.
- 3 You can read and/or write data addressable by the server. See “Address restrictions” on page 20.

Address restrictions

The addressable areas for the Applicom Communication Server.

Memory Area	Addressable Range	Size	Addressing Mode
Bit Database	0 - 32767 (dec)	32768 bits	bit addressable
Word Database	0 - 32767 (dec)	32768 words (1 word = 16 bits)	bit and word addressable

Troubleshooting point configuration errors

Incorrectly configured points can reveal themselves in one of two ways: when downloading, or when scanning.

Errors when downloading

If points are configured with illegal configuration details, this may cause problems when they are downloaded to the server. If this occurs, read the out file created and correct the errors.

Note that when errors might not be displayed when using Quick Builder to build points. If this is the case, manually run **pnbld** to get the required details.

The most common errors are:

84E0 (invalid address)

Check that the Address lies within the correct range:

$$offset \leq Address \leq offset + maxref$$

where *maxref* is 8192 bits for controllers that address Bit table, and 8192 words for controllers that address Word table.

84E7 (invalid bit number)

Check that the bit number lies in the valid range (0 to 15). Also check that a read or write has not been requested across a word boundary.

Errors when scanning

If points are built with addresses which are valid but not configured in the controller, these will not be reported as errors until the server attempts to acquire data for the points. They become evident in the point detail display, where it shows a bad value (indicated by inverse video).

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Getting started

1

This reference provides the information you need to set up, configure, and test ASEA controllers.

Steps for connecting and configuring ASEA.

Complete each step before commencing the next step.

Step:	Go to:
Set up the controller and network	page 10
Define channels using Quick Builder	page 12
Define controllers using Quick Builder	page 15
Download channel and controller definitions to the server	
Test communications	page 22
Define controller points using Quick Builder	page 17

Support and documentation for ASEA

Device support

The server supports the ASEA controller via an RS-232 link.

Indirect connection via MasterView 800 is not supported.

Other documentation on ASEA

The following ASEA manuals provide information about installing and programming ASEA controller:

- *ASEA MasterPiece 100/200 Buyers Guide*, 7650 033-201/3
- *ASEA MasterPiece 200 User Manual*, 7650 039-201
- *ASEA Master Excom User's Manual*, 7650 056-201

ASEA setup

2

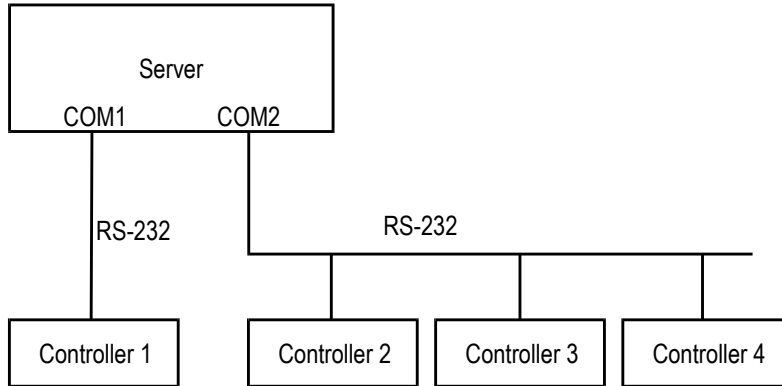
This chapter describes how to set up an ASEA controller.

The tasks for setting up an ASEA controller are:

For:	Go to:
Supported architectures	page 8
Setting up a controller	page 10

Architectures for ASEA

The following figure shows examples of point-to-point and multi-dropped RS-232 links.



ASEA data files

Data in an ASEA controller is stored in data files. The server can access the following types of files via the EXCOM protocol.

Because the server cannot write to the AO and DO files, you need to write output data to the DAT file and configure the controller so that the data is transferred to the appropriate output addresses. See the ASEA documentation for details.



Note

The server cannot access the DSD file type.

File Type	Description	Controller Type	Data Type	Server Access
AI	Analog Input	3	AISTS, AIVAL	Read only
AO	Analog Output	4	AOSTS, AOVAL	Read only
DAT	Data Exchange File	5	DAT	Read/write
DI	Digital Input	1	DISTS, DIVAL	Read only
DO	Digital Output	2	DOSTS, DOVAL	Read only

In Quick Builder, you have to define a “logical” controller for each file type that the server needs to access in a physical controller. For example, if the server needs to access the DI and AI files in a particular controller, you must define two controllers in Quick Builder: a Type 1 for the DI file and a Type 3 for the AI file.

Using offsets

The ASEA files contain 32767 records, but the server can only access a maximum of 4096 records in a particular file. Therefore if the server needs to access records beyond that limit, you may need to define several “logical” controllers in Quick Builder, each with an appropriate offset.

Example

If the server needs to access records 0 to 8191 and 10000 to 14095, you must define three controllers, with the following offsets:

- 0, which can access records 0 to 4095
 - 4096, which can access records 4096 to 8191
 - 10000, which can access records 10000 to 14095
-

Setting up an ASEA controller

The ASEA controller is connected to the server via an RS-232 link. RS-232 allows direct connection over distances less than 15 meters. For longer distances, you need to connect the controller via a modem.

Figure 1 Wiring for direct connection to server's COM port

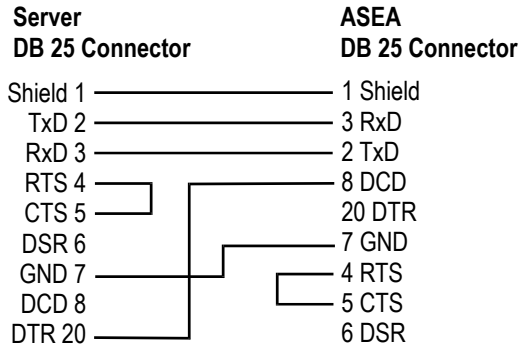
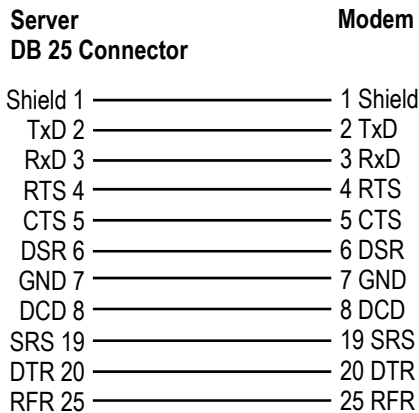


Figure 2 Wiring for connection via a modem



ASEA configuration and addressing


3

This chapter describes how to configure an ASEA controller using Quick Builder.

For information about:	Go to:
Defining a ASEA channel	page 12
Defining a ASEA controller	page 15
Defining an address for a point parameter value	page 17
Optimizing scanning performance	page 19

Defining an ASEA channel

To define a channel:

- 1 Click  to display the Add Items dialog.
- 2 Select channel as the item and ASEA as the type.
- 3 Set the property values on the Main tab—see “ASEA channel Main properties” on page 12.
- 4 Click the Port tab and for **Port Type** select serial.
See “ASEA channel Port properties” on page 13.

ASEA channel Main properties

The Main tab defines the basic properties for an ASEA channel.

Property	Description
Name	The unique name of the channel. A maximum of 10 alphanumeric characters (no spaces, underscores or double quotes).
Description (optional)	A description of the channel. A maximum of 30 alphanumeric characters, including spaces.
Marginal Alarm Limit	<p>The communications alarm limit at which the channel is declared to be marginal. When this limit is reached, a high priority alarm is generated. This limit is the channel barometer, which monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer is incremented by 2 or more, depending on the error and decremented for each good call.</p> <p>To calculate an acceptable limit, multiply the square root of the number of controllers on the channel with the controllers' Marginal Alarm Limit (generally, you specify the same value for all controllers on a particular channel). For example, if there are 9 controllers, and you have set the controllers' Marginal Alarm Limit to 10, the value would be $\sqrt{9} \times 10$ (that is, 30).</p>
Fail Alarm Limit	<p>The communications alarm limit at which the channel is declared to have failed. When this barometer limit is reached, an urgent alarm is generated.</p> <p>Set this to double the value specified in Marginal Alarm Limit.</p>

Property	Description
Connect Timeout	The time, in seconds, the server attempts to connect to the controller before giving up. The default 10 seconds.
Read Timeout	The time, in seconds, the server attempts to read data from a controller before giving up. The default is 2 seconds.
Item Type	Shows the type of item specified when this item was created.
Last Modified	Shows the date of the most recent modification to this channel's property details.
Item Number	The unique item number currently assigned to this item. You can change the item number if you need to match your current server database configuration. The number must be between 1 and the maximum number of channels allowed for your system.

ASEA channel Port properties

The Port tab defines the communication-related properties for a channel.

Select `serial` for **Port Type**. (The `TerminalServer` and `LANVendor` options are not applicable to ASEA controllers.)



Note

Set the port properties to the same values as those specified when configuring the controller.


Serial port properties

Property	Description
Serial Port Name	The name of the serial port.
Baud Rate	The number of data bits per second. The default is 9600.
Number of Data Bits	The number of data bits used for transmission. The default is 8.
Stop Bits	Set this to 1.
Parity	The parity. The default is NONE.
Checksum	The type of checksum error detection used for the port. Select the value that matches the setting on the controller: <code>CRC16_0</code> , <code>CRC16_1</code> or <code>None</code> .

Property	Description
XON/XOFF	<p>The type of XON/XOFF software flow control used to stop a receiver from being overrun with messages from a sender. The types are:</p> <ul style="list-style-type: none"> • None (default) • Input (use XON/XOFF to control the flow of data on the receive line) • Output (use XON/XOFF to control the flow of data on the transmit line)
RS-232	<p>These options are applicable to the RS-232 link.</p> <p>Enable RTS/CTS flow control. Select this if you want to use RTS/CTS for flow control to stop a receiver from being overrun with messages from a sender.</p> <p>Detect DCD. Select this if the Data Carrier Detect communication status line of the COM port requires monitoring (usually when using modem or microwave linking). When selected, the communications fails if the desired COM status line is not high—for example, on a dial-up link connection for a modem.</p> <p>Detect DSR. Select this if the Data Set Ready communication status line of the COM port requires monitoring (usually when using modem or microwave linking). When selected, the communications fails if the desired COM status is not achieved.</p>
RS-485	Not applicable.

Defining an ASEA controller

To define a controller:

- 1 Click  to display the Add Items dialog.
- 2 Select controller as the item and ASEA as the type.
- 3 Set the property values on the Main tab. See “ASEA controller Main properties” on page 15.

ASEA controller Main properties

The Main tab defines the basic properties for an ASEA controller.

Property	Description
Name	The unique name of the controller. A maximum of 10 alphanumeric characters (no spaces, underscores or double quotes).
Description	(Optional) A description of the controller. A maximum of 30 alphanumeric characters, including spaces.
Channel Name	The ASEA channel on which the controller communicates with the server.
Controller Type	The controller type, which determines what type of file is being accessed: <ul style="list-style-type: none"> • DI • DO • AI • AO • DAT See “ASEA data files” on page 8.
Offset	The offset the server uses when accessing the controller file. See “Using offsets” on page 9.
Marginal Alarm Limit	The communications alarm marginal limit at which the controller is declared to be marginal. When this limit is reached, a high priority alarm is generated. This limit is the controller barometer, which monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer is incremented by 2 or more, depending on the error and decremented for each good call. The default value is 25.

Property	Description
Fail Alarm Limit	The communications alarm fail limit at which the controller is declared to have failed. When this barometer limit is reached, an urgent alarm is generated. Set this to double the value specified in Marginal Alarm Limit .
Item Type	Shows the type of item specified when this item was created.
Last Modified	Shows the date of the most recent modification to this controller's property details.
Item Number	The unique item number currently assigned to this item. You can change the item number if you need to match your current server database configuration. The number must be between 1 and the maximum number of channels allowed for your system.


Defining an ASEA address for a point parameter

Entering an address

For **PV Source Address**, **Source Address**, and **Destination Address** the format for an ASEA controller address is:

ControllerName Location

Part	Description
<i>ControllerName</i>	The name of the ASEA controller.
<i>Location</i>	The address within the controller where the value is stored. See “Location syntax” on page 17.

If you would like help when defining an address, click  next to **Address** to display Address Builder. For details, see the help.

Location syntax

The format for the location is:

Address DataType [DataFormat|BitNumber]

Part	Description
<i>Address</i>	The record number to read from the controller. Record numbers range from 1 to 32767.
<i>DataType</i>	The data type of the parameter being addressed. See “Data types and formats” on page 18.
<i>DataFormat</i>	The data format of the parameter being addressed. See “Data types and formats” on page 18.
<i>BitNumber</i>	The bit number being addressed, which is only applicable to DISTs, DOSTs, AISTs and AOSTs data types. The bit range is 1 to 12.

Example Record 6 of the DAT file as a 32-bit unscaled value.
 6 DAT R32

 Bit 5 of record 12 of the DISTS file.
 12 DISTS 5

 Bit 30 of record 20 of the DAT file.
 20 DAT BIT 30

Data types and formats

The data types and formats are shown in the following table.

Data Type	Data Format	Record Value Accessed
DISTS		Bits 1 to 12
DIVAL		0 or 1
DOSTS		Bits 1 to 12
DOVAL		0 or 1
AISTS		Bits 1 to 12
AIVAL	R32	32 bits, real, unscaled
AOSTS		Bits 1 to 12
AOVAL	R32	32 bits, real, unscaled
DAT	R32	32 bits, real, unscaled
	C16	16 bits, integer, unscaled
	U16B	Unsigned 16 bits, integer, scaled
	S16B	Signed 16 bits, integer, scaled
	U4095	12 bits, scaled
	Bit <i>n</i> (<i>n</i> = 1 to 32)	0 or 1

Optimizing scanning performance

Minimize the number of scan packets — and the burden on the server — by using a small number of available scan periods for all your point definitions.

Example scan periods:

- 5 seconds for fast changing, important parameters
- 60 seconds for 1 minute PV history, parameters that change every few minutes
- 300 seconds for slow changing parameters

You verify your scanning strategy by using the List Scan utility, **lissen**, to list the scan packets you have built.

Server tasks for ASEA

4

This chapter describes tasks for the ASEA that you perform either on the server or from any Station.

For information about:	Go to:
Testing communications with field devices	page 22

Testing ASEA communications

You use the diagnostic utility, **astst**, to test communications between the ASEA controller and the server.



Note

Do not use the utility while the server is running because it will interfere with the operation of the server.

To run the utility:

- 1 Open a Command Prompt window.
- 2 Type **astst** and press ENTER.
Entries are self-explanatory.

To display help for **astst**, type **h** and press ENTER.

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Bristol Babcock Interface Reference

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Getting started

1

This reference describes how to set up, configure, and test Bristol Babcock controller communications with the server. There is detailed information for defining the controller using Quick Builder. Before you can use Quick Builder to define Bristol Babcock channels and controllers, you will need to use the special utility **bbhdw**.

The following steps show the order in which the controller interface should be configured. Complete each step before starting the next.

Steps for connecting and configuring a Bristol Babcock Controller

Steps	Go to:
Set up Bristol Babcock controller.	page 10
Install ACCOL tools on server.	page 10
Install initial load onto Bristol Babcock nodes via the Portable Engineers Interface (PEI)	page 11
Connect all cables and modems.	page 12
Create a <code>netfile.dat</code> file using ACCOL utility, nettop5 .	page 14
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Download channel and controller definitions to the server	
Test communications with the server	page 42
Create and download ACCOL load files using aic5 and toolkit5 .	page 28
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Support and documentation for Bristol Babcock

Bristol Babcock models supported

Generally, the server supports any device that communicates via the Bristol Babcock Synchronous Asynchronous communication protocol (BSAP) and fits in the Network 3000 architecture.

Only the DPC 3330 has been qualified with the server.

Other documentation for Bristol Babcock

The following Bristol Babcock document describes the address space of all the devices supported by this interface in great detail. It also provides information about the physical configuration of the controllers. Reading this document is also useful when installing the interface.

- *DPC 3330 Instruction Manual*

The following Bristol Babcock documents might also be useful when installing and configuring the DPC 3330:

- *Network 3000 Communication User's Guide*
- *RDC 3350 User's Manual*
- *Bristol Babcock ACCOL Reference* and ACCOL Tools Binders
- *ACCOL II Interactive Compiler (AIC) Manual*
- *ACCOL II Reference Manual*

From Honeywell:

- *Installation Guide*
- *Hardware and Point Build Reference*

Terms

PEI

Portable Engineers Interface. The PEI usually consists of a portable computer with Bristol Babcock software loaded: **nettop5**, **aic5**, **toolkit5**, **taskspy5**.

NRT

Node Routing Table. The definition of the network sourced by `netfile.dat`.

Network Level 1

The local node level from the server's perspective.

Bristol Babcock controller setup

2

This chapter describes how to set up an Bristol Babcock controller.

The tasks for setting up a Bristol Babcock controller are:

For:	Go to:
Installing ACCOL tools on the server	page 10
Installing the initial load on the controllers using the PEI	page 11
Connecting cables and modems	page 12
Define the network using the nettop5 utility	page 14

Supported architecture

The following architectures are possible for Bristol Babcock:

- Direct serial connection via a Bristol Babcock Data Concentrator using RS-232 and BSAP protocol
- Multidropped on a single serial link using RS-485

The RS-232 connection is between a serial port on the server and the serial interface on the Bristol Babcock device. The BSAP protocol is fully described in the *Network 3000 Communications User's Guide*.

The RS-485 connection requires a RS-232 to RS-485 Black Box converter or Stallion EasyConnection adapter between the server serial port and the RS-485 network. See the *Installation Guide* for information about using these devices with the server.

Installing ACCOL tools on the server

Some ACCOL tools are required to run on the server platform. These are:

- **aic5** (produces ACO files)
- **aclink5** (produces ACL files)
- **nettop5** (produces netfile.dat file)
- **toolkit5** (downloads ACL files)

Install these tools in the \acco1 folder. ACCOL tools can be started from the Windows Explorer or a command prompt from any working folder, for example: \acco1\aclink5,\acco1\nettop5.

Installing the initial load on the Bristol Babcock node

A bootstrap process is required to configure the communications parameters. This is achieved by using a PEI to download a small ACCOL load program which sets up the communication ports. This is done before you connect the Bristol Babcock devices to the server. See the *ACCOL II Interactive Compiler and Toolkit* manuals for instructions on ACCOL programming and PEI operation.

To create and download an initial load on the PEI:

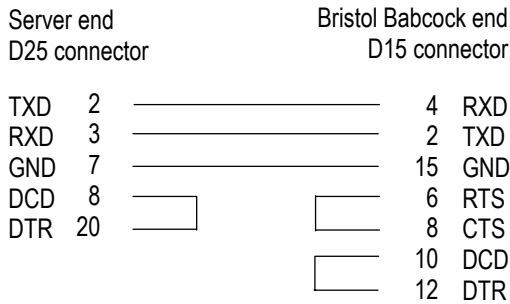
- 1 Using **aic5** software on the PEI to create the initial load, set the communication port to the correct baud rate, parity, and protocol for server communication, particularly:
 - Baud rate (9600, 19.2K, or 38.4K)
 - Parity (None)
 - Protocol (RS-232)
- 2 Use **aclink5** to link the ACO file and create an ACL file.
- 3 Use **toolkit5** to download the ACL file to the Bristol Babcock node.

Write down the communication characteristics of local nodes (that is, nodes on network level 1 that communicate directly with the server) in preparation for defining channel connections to controllers in Quick Builder.

Connecting cables

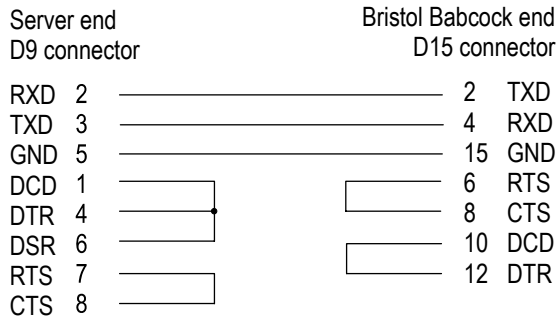
After downloading the initial load to all Bristol Babcock nodes, connect the cables. The server to Bristol Babcock connection usually uses an RS-232 cable. “RS-232 connect using D15 to D25” on page 12 shows the pinouts for an RS-232 connection to a server-end D25 serial port. Bristol Babcock devices use a 15-pin D connector.

Figure 1 RS-232 connect using D15 to D25



“RS-232 connect using D15 to D9” on page 12 shows the pinouts for an RS-232 connection to a server-end D9 serial port.

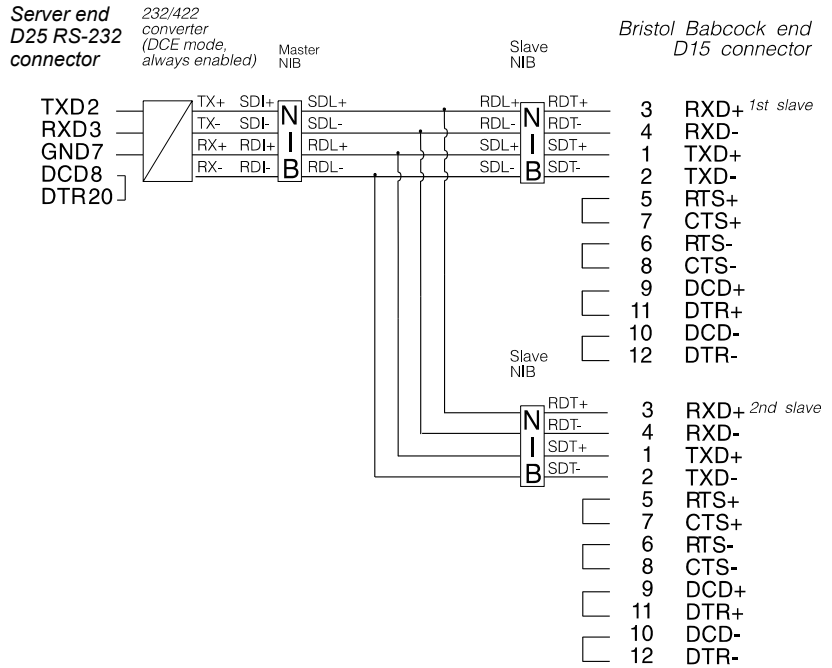
Figure 2 RS-232 connect using D15 to D9



The server can connect to an RS-485 network using additional hardware. At the server end an RS-232/RS-485 converter or adapter is required. At the controller end, Network Interface Boxes (NIB), supplied by Bristol Babcock, are required. The *DPC3330 Instruction Manual* (CI3330) gives the configuration for the NIB hardware.

“RS-485 network with NIBs and an RS-485 converter” on page 13 shows the pinouts for RS-485 network with NIBs and a converter.

Figure 3 RS-485 network with NIBs and an RS-485 converter



Defining the network

Define the network topology using the Bristol Babcock utility **nettop5**. See the appropriate Bristol Babcock documentation for details on how to use this program.

The output of **nettop5** is a file called `netfile.dat` which is used in two ways:

- Firstly, it is downloaded to local nodes by the server so that those nodes can send global messages.
- Secondly, it is used as an input for the **bbhdw** utility and the resulting file is used for defining connections to controllers in Quick Builder.

Downloading netfile.dat to the network

The `netfile.dat` file is saved to `\acco1` by default. It is then automatically downloaded from this folder by the server if the system has a single network (channel).

If there are multiple networks (and therefore channels) connected to the server, for the correct `netfile.dat` file to be downloaded automatically it must be in:

```
server\data\bb\chnyyy\
```

where

`yyy` is the channel number of the Bristol Babcock Network

Copy the `netfile.dat` file produced in `\acco1` to a file of the same name in `server\data\bb\chnyyy\` for each channel. The server will look in these folders first.

Bristol Babcock controller configuration and addressing

3

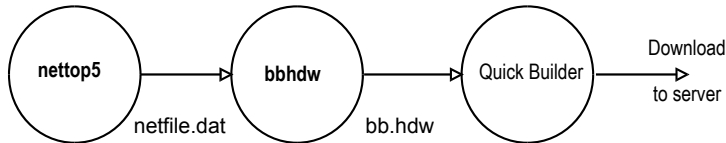
This chapter describes how to configure a Bristol Babcock controller for the system using Bristol Babcock utility, **bbhdw**, and Quick Builder. For each configuration procedure, there is detailed information covering all tasks.

For:	Go to:
Defining the connections to controllers	page 16
Steps for defining a Bristol Babcock channel	page 18
Steps for defining a Bristol Babcock controller	page 24
Fine tuning communications by creating and downloading ACCOL load files	page 28
Steps for defining points that address Bristol Babcock	page 30
Defining points that reference signals	page 31
Defining points that reference arrays	page 35
Point configuration errors	page 37
How to optimize scanning performance	page 38

Defining the connections to controllers

The process involved in defining connections to controllers is shown.

Figure 4 Defining connections to controllers



The essential steps for configuring Bristol Babcock hardware and defining the communication channels are:

- 1 Convert the Bristol Babcock `netfile.dat` file (containing a complete definition of the network) to a hardware definition file. The utility used is **bbhdw**. The first step in the total process, creating the `netfile.dat` file, is described in “Defining the network” on page 14.
- 2 Use the values obtained from the **bbhdw** output file to define Bristol Babcock channels and controllers in Quick Builder.
- 3 After the Bristol Babcock channel and controllers are defined in Quick Builder and the definitions downloaded to the server, test the communications between the server and the controller using the **bbtst** diagnostic utility—see “Testing communications with the server” on page 42.

Using the BBHDW utility

This utility converts the `netfile.dat` file to a hardware definition file suitable for hardware building. The `netfile.dat` file is produced by the Bristol Babcock **nettop5** program and is a complete definition of the network.

The syntax for **bbhdw** is:

```
bbhdw [options]
```

Option	Description
<code>-i nrtfile</code>	Input the NRT source file. <code>netfile.dat</code> is the default—the <code>.DAT</code> extension does not need to be specified.
<code>-o hdwfile</code>	Output hardware source file. <code>netfile.hdw</code> is the default. The <code>.hdw</code> extension does not need to be specified.
<code>-z n</code>	Zone/area number. Take Bristol Babcock nodes assigned to zone/area <code>n</code> only. Defaults to all nodes.

Option	Description
<i>-c cc</i>	Channel number. Assigns all controllers to channel number cc. The default is 1.
<i>-r rrr</i>	Starting controller number is rrr. The default is 1.

Example

Some example calls:

bbhdw

Extract all nodes from `netfile.dat` and create `netfile.hdw` using channel 1 and two controllers per node, (one for signals and one for arrays) starting at controller 1.

```
bbhdw -o bbchn
```

As above, except `bbchn.hdw` is created.

```
bbhdw -z 3
```

Extract all nodes in area/zone 3 only.

```
bbhdw -c 10 -r 5
```

Put all nodes on channel 10, beginning with controller 5.

Output file example

The `bbhdw` output file consists of the following entries:

```
DEL CHNCC
ADD CHNCC SERIAL PORT=COM1 BAUD=9600 PARITY=none READ=10
DEF CHNCC BB NAME=BBabcock MARG=50 FAIL=100 NRTSHIFT=s NRTMASK=m
NRTVER=v
```


Then for each node a controller of each type (signals and arrays) is added (`sss = rrr+1`):

```
DEL RTUrrr
DEL RTUsss
DEF RTUcc.rrr 0 NODENAME=dpc1 NAME=dpc1_sig ID=addr/level
NWID=g1addr MARG=25 FAIL=50
DEF RTUcc.sss 1 NODENAME=dpc1 NAME=dpc1_arr ID=addr/level
NWID=g1addr MARG=25 FAIL=50
```

Defining a Bristol Babcock channel

You need to define a channel for the connection the server uses to communicate with the Bristol Babcock networks.

To define a channel using Quick Builder:

- 1 Click  to open the Add Items dialog box.
- 2 Select channel from **Add Items**.
- 3 Select `bristol_babcock` from **Type**.
- 4 Enter the channel details on the Main property page for the channel. Use the output of `bbhdw` (the `DEF CHNcc` line) generated.
- 5 To complete the channel definition, click the Port tab and define a port. See “Bristol Babcock Port properties” on page 21.

Bristol Babcock channel Main properties

Use the Main tab to enter the basic channel properties for a Bristol Babcock channel.

If the `DEF CHNcc` line produced was:

```
DEF CHN01 BB NAME=BBabcock MARG=50 FAIL=100 NRTSHIFT=10
      NRTMASK=1f
      NRTVER=225
```

you would enter:

- **10** for NRT Shift
- **1f** for NRT Mask, and
- **225** for NRT Version

Property	Description
Name	Type a unique name for the channel. A maximum of 10 alphanumeric characters can be used.(Double quotation marks and spaces are not allowed.)
Description	(Optional) Type a description of the channel. A maximum of 30 characters can be used, including spaces.

Property	Description
Marginal Alarm Limit	<p>MARG=</p> <p>Communications alarm marginal limit at which the channel is declared to be marginal. When this limit is reached, a high priority alarm is generated. A channel barometer monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer increments by 2 or more, depending on the error and decrements for each good call. This parameter is not produced by the bbhdw utility.</p> <p>To calculate an acceptable limit, multiply the square root of the number of controllers on the channel by the Marginal Alarm Limit defined for those controllers. (Normally, you specify the same value for all controllers on a channel). For example, if there are 9 controllers on the channel and their Marginal Alarm Limit is set to 10, the value would be $[\sqrt{9}] \times 10 = 30$.</p>
Fail Alarm Limit	<p>FAIL=</p> <p>Communications alarm fail limit at which the channel is declared to have failed. When this barometer limit is reached, an urgent alarm is generated. This parameter is not produced by the bbhdw utility.</p> <p>Set this to double the value specified for the channel Marginal Alarm Limit.</p>
NRT Shift	<p>NRTSHIFT=</p> <p>Node Routing Table Level 0 shift count. This is a network parameter. For more information see the <i>Bristol Babcock Network 3000 User's Guide</i>. This parameter is produced by the bbhdw utility. This parameter is not normally changed.</p>
NRT Mask	<p>NRTMASK=</p> <p>Node Routing Table Level 0 bit mask. This is a network parameter entered as a hexadecimal number. For more information see the <i>Bristol Babcock Network 3000 User's Guide</i>. This parameter is produced by the bbhdw utility. This parameter is not normally changed.</p>
NRT Version	<p>NRTVER=</p> <p>Node Routing Table version. This is a network parameter. This number will be produced by the utility bbhdw. This parameter is not normally changed.</p>

Property	Description
Exception Poll Period	<p>POLLPER=</p> <p>The default value is 10 seconds. All controllers will be put on an exception poll for the scan period closest to this value. This parameter is not produced by the bbhdw utility. See “Optimizing scanning performance” on page 38 for more guidance.</p>
Control Timeout	<p>RESPONSE=</p> <p>Response time for a device on the network. This value is multiplied by the network level to get an absolute response time between the server and the remote device. The default is 10 seconds. Should be set to the worst case RDB round trip time for any level of the network.</p>
Connect Timeout	<p>CONNECT=</p> <p>Amount of time, in seconds, the server waits to connect to the controller before abandoning the connection. This parameter is not produced by the bbhdw utility.</p> <p>Type a new value in this field if you do not want the default, 10 seconds.</p> <p>Use the default value unless the communications line has a high error rate or unless you are using modems.</p>
Read Timeout	<p>READ=</p> <p>Amount of time, in seconds, the server waits for a reply from the controller. Type a new value in this field if you do not want the default, 2 seconds.</p> <p>Use the default value unless the communications line has a high error rate or unless you are using modems.</p>
Write Delay	<p>The time, in milliseconds, the server waits before writing to the controller if the controller has a serial port connection.</p>
Item Type	<p>Shows the type of item specified when this item was created.</p>
Last Modified	<p>Shows the date of the most recent modification to this channel’s property details.</p>
Last Downloaded	<p>This shows the date that the item was last downloaded to the server.</p>
Item Number	<p>This field displays the unique item number currently assigned to this item by Quick Builder. You can change the item number displayed in this field if you need to match your current server database configuration. The item number must be between 1 and the maximum number of channels allowed for your system.</p>

Bristol Babcock Port properties

Select the Port Property sheet and enter the channel communication settings. Use the output of **bbhdw** (the ADD CHNcc line) previously generated.

The Port tab defines the communication-related properties for a channel. The Port Type for Bristol Babcock can be:

- **serial**. A serial communications interface, such as RS-232. See “Serial Port properties” on page 21.
- **terminalserver**. A communications link that enables controllers with a serial interface to be connected to a LAN. See “Terminal server port properties” on page 22.
- **LANvendor**. Not applicable for Bristol Babcock.

Serial Port properties

The Serial Port settings must match the output of the **bbhdw** file. For example, if the output of **bbhdw** generates an ADD CHNcc line as:

```
ADD CHN01 SERIAL PORT=COM1 BAUD=9600 PARITY=NONE READ=10
```

then enter:

- **serial** as the Port Type
- **COM1** as the Serial Port Name
- **9600** as the Baud Rate
- **None** as the Parity

Property	Description
Serial Port Name	The device name of the serial port.
Baud Rate	The number of data bits per second. The default is 9600.
Number of Data Bits	The number of data bits used for transmission. The default is 8.
Stop Bits	The number of stop bits used for transmission. The default is 1.
Parity	The parity verification used on the port. The default is NONE.
Checksum	Not applicable for Bristol Babcock. Set to NONE (the default).
XON/XOFF	Not applicable for Bristol Babcock. Set to NONE (the default).

Property	Description
RS-232	<p>Only applicable for a an RS-232 link. (The RS-232 and RS-485 settings are mutually exclusive.)</p> <p>Enable RTS/CTS flow control. Select this if you want to use RTS/CTS for flow control to stop a receiver from being overrun with messages from a sender.</p> <p>Detect DCD. Select this if the Data Carrier Detect communication status line of the COM port requires monitoring (usually when using modem or microwave linking). When selected, the communications fails if the desired COM status line is not high—for example, on a dial-up link connection for a modem.</p> <p>Detect DSR. Select this if the Data Set Ready communication status line of the COM port requires monitoring (usually when using modem or microwave linking). When selected, the communications fails if the desired COM status is not achieved.</p>
RS-485	Not applicable to Bristol Babcock connections, even if RS-232/RS-422 converters are used.
Protocol	The protocol to be used to communicate on this Bristol Babcock channel. All controllers on the channel must be configured for this protocol. The default is BSAP .

Terminal server port properties

If a terminal server is to be used to communicate with your Bristol Babcock PLCs, then select **TerminalServer** as the Port Type and configure the terminal server itself with the serial port settings in the **bbhdw** output **ADD CHNcc** line. See “Serial Port properties” on page 21.


Property	Description
Terminal Server TCP Host Name	The name and port number of terminal server to which the channel is connected.
Terminal Server TCP Port No	You can specify either a TCP host name or an IP address, but it must match the TCP host name used when you installed and internally configured the terminal server.
Idle Timeout	<p>The time, in seconds, the channel waits for a successful connection to the server before closing the connection.</p> <p>A value of 0 indicates that the connection is never closed.</p>
Checksum	Not applicable to Bristol Babcock. Use the default, None .

Property	Description
Protocol	The protocol to be used to communicate on this Bristol Babcock channel. All controllers on the channel must be configured for this protocol. The default is BSAP .

Defining a Bristol Babcock controller

You need to define a controller to describe each PLC on a channel. Separate controllers must be defined in the server to address signal data and array data, see “Bristol Babcock controller types” on page 27.

To define a controller using Quick Builder:

- 1 Click  to open the Add Items dialog box.
- 2 Select **controller** from **Add Items**.
- 3 Select **Bristol Babcock** from **Type**.
- 4 Enter the property definitions for the controller on the controller Main property page. Use the output of **bbhdw** (the DEF RTUrrr line) generated.

Bristol Babcock controller Main properties

Use the Main tab to define the basic properties for a Bristol Babcock controller. The controller settings must match the output of the **bbhdw** file. For example, if the output of **bbhdw** generates an DEF RTUrrr line as:

```
DEF RTU01.001 NODENAME=TEST NAME=TEST SIG ID=001/1 NWID=1024
MARG=25 FAIL=50
```

you would enter:

- SIG for Controller Type
- 001 for Local Address
- 1 for Network Level, and
- 1024 for Global Address

Property	Description
Name	Type a unique name for the controller. A maximum of 10 alphanumeric characters can be used. (Double quotation marks and spaces are not allowed.)
Description	(Optional) Type a meaningful description for this controller. A maximum of 30 characters, including spaces, can be entered.
Channel Name	The name of the channel on which the controller communicates. In the list of channel names, click the name. You need to have defined the channel in order for it's name to appear in the list.

Property	Description
Marginal Alarm Limit	<p>MARG=</p> <p>The communications alarm marginal limit at which the controller is declared to be marginal. When this value is reached, a high priority alarm is generated. This limit applies to the controller barometer which monitors the total number of requests to the controller and the number of times the controller did not respond or response was incorrect. The barometer increments by 2 or more, depending on the error and decrements for each good call.</p> <p>Type a new value in this field if you do not want the default, 25.</p>
Fail Alarm Limit	<p>FAIL=</p> <p>The communications alarm fail limit at which the controller is declared to have failed. When this value is reached, an urgent alarm is generated.</p> <p>Set this to double the value specified for the controller Marginal Alarm Limit.</p>
Controller Type	<p>Select the controller type as one of:</p> <ul style="list-style-type: none"> • SignalsOnly • ArraysOnly <p>See “Bristol Babcock controller types” on page 27.</p>
Local Address	<p>ID=addr/level</p> <p>Local address in network (1 to 255). This is set via DIP switches on the device. This is the addr part of the ID=addr/level value.</p>
Network Level	<p>ID=addr/level</p> <p>Level in the network (1 to 6). This is the level part of the ID=addr/level value.</p>
Global Address	<p>NWID=</p> <p>Network Global address (decimal)</p>
Transaction Timeout	<p>TNS_TIME</p> <p>Transaction table timeout in seconds. Default is (60 * network level). This timeout value is the length of time that the server will wait for an RDB response. It should be set to the worst case RDB round trip time between the server and the controller. This will be affected by poll periods of intermediate nodes, baud rates and so on.</p>
Node Name	<p>NODENAME=</p> <p>Four character node name assigned via the aic5 software program.</p>

Property	Description
Additional definitions for signal (SIG) controller type	<p>The following parameters all relate to Report By Exception parameters. They correspond exactly to terminals of the RBE module. See the <i>ACCOL Reference Manual</i> for more information.</p> <p>RDB Security level (RDBSECLVL=) RDB security level Default setting is 15. Not normally changed.</p> <p>RBE Scan Rate (RBE_PERIOD=) RBE scan period in tenths of seconds. Default is 300.</p> <p>RBE Scan Slice (RBE_SLICE=) RBE scan slice parameter. Default is 1.</p> <p>RBE Stop Xmit (RBE_STOPXMIT=) RBE stop transmit count. Default is 10.</p> <p>RBE Timeout (RBE_WAITINIT=) RBE timeout between successive wait_init messages in tenths of seconds. Default is 600.</p> <p>RBE Inhibit (RBE_INHIBIT=) Check to Inhibit use of Bristol Babcock report by exception messages.</p> <p>Alarm Inhibit (ALM_INHIBIT=) Check to Inhibit use of Bristol Babcock alarm messages.</p> <p>SOE Inhibit (SOE_INHIBIT=) Check to Inhibit insertion of Bristol Babcock alarms into the Sequence of Events file.</p>
Item Type	Shows the type of item specified when this item was created.
Last Modified	Shows the date of the most recent modification to this channel's property details.
Item Number	This field displays the unique item number currently assigned to this item by Quick Builder. You can change the item number displayed in this field if you need to match your current server database configuration. The number must be between 1 and the maximum number of controllers allowed for your system.

Bristol Babcock controller types

Data within a Bristol Babcock device is divided into two types—signals and arrays. Separate controllers must be defined in the server to address signal data and array data.

Each controller type has addressing limitations as indicated:

Controller type	Server addressable range
Signals	Up to 1927 signals per server controller
Arrays	Up to 5461 array elements per server controller

If this array addressing capability is not adequate, extra server controllers can be configured to access the array data. There is a maximum of one server signal controller per physical Bristol Babcock controller.

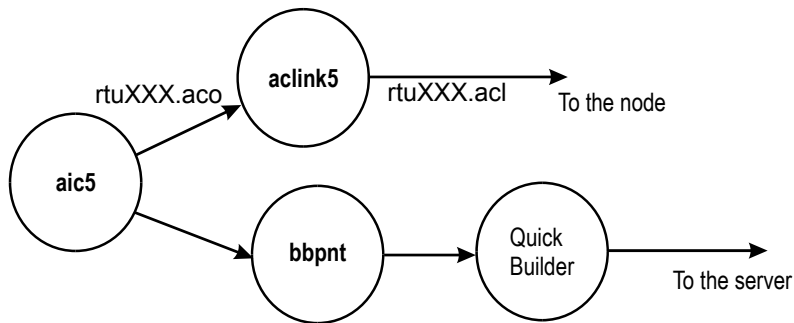
Using ACCOL load files to define scanning and control strategies

After you have initial communication with the server established, you can use the ACCOL software on the server to create and download the load files. Load files define the control strategy for the node and hold all data gathered in the form of signals or arrays.

Understanding load files

Load files are created using ACCOL tools on the server and are downloaded to the Bristol Babcock node under the server's control. They are also used by the `bbpnt` utility to create a `.pnt` file for importing into Quick Builder. The process used in creating a load file is shown in "Producing a load file" on page 28.

Figure 5 Producing a load file



Downloading ACL files to the Bristol Babcock node

To download the ACL load file from the server, the file must be named as follows:

`RTUXXX.ACL`

where

- `xxx` is the server RTU (controller) number for the Bristol Babcock node.

This file must exist in `server\data\bb\chnyyy`, where `yyy` is the channel number of the Bristol Babcock network. Note that there will be a single load file for each Bristol Babcock node. However, because the server can have more than one controller on a particular node, there may be more than one controller in the corresponding load file. Ensure that the naming convention on your `.aco` files reflects this.

**Caution**

When downloading to controller nodes that are masters in the Network 3000 topology, all subordinate controllers must also be placed “out of service”. If not, the download will be very slow and may fail. This applies equally to multiple logical controllers that reference the same Network 3000 node.

To download the .ac1 file:

- 1 Put the channel “in service” and the controller “out of service”. This is done on the appropriate Station displays. Download must also be permitted by the server for both the channel and the controller.
- 2 Initiate the download from the Controller Configuration display in Station by clicking **Download**.
- 3 A prompt for confirmation is displayed. Respond by typing **y** and press ENTER to continue the download.

An ACL download can take considerable time depending on the Bristol Babcock network architecture and the size of the .ac1 file. The download process reports the file record being downloaded in the Message Zone on Station.

Defining report by exception in a load

When Reporting By Exception is required it is important to remember that extended memory must be specified in the load file and the RBE module must be included.

Defining points that address Bristol Babcock

The steps for defining points with parameters that address Bristol Babcock controllers are:

- 1 For points that reference signals:
 - a. Using the **bbpnt** utility, create a point source file from the ACO file. The ACO file is produced by the Bristol Babcock **aic5** program and is a complete definition of the load that resides in a particular controller. See “Defining points that reference signals” on page 31.
 - b. Import the **bbpnt** output file into Quick Builder.
 - c. Configure alarms for these points as required. See “Configuring alarms for signal data” on page 34.
- 2 For points that reference arrays, you define these points wholly within Quick Builder. (The **bbpnt** utility does not generate a point definition file for points that reference arrays.) See “Defining points that reference arrays using Quick Builder” on page 35.
- 3 When you have finished defining/editing both types of points in Quick Builder and are ready to download them, disable the Bristol Babcock channel on the server.
- 4 Download the point definitions to the server.
- 5 Enable the Bristol Babcock channel.

Defining points that reference signals

The **bbpnt** utility converts a Bristol Babcock ACO file to a server point build file. This utility generates points that address signals in the load.

Before assigning a point reference number (that is, ANAnnn, STAnnn), **bbpnt** checks to see if the point name already exists in the server database. If it does exist, the same point reference number is used. If it does not exist, the next unused point reference number is used.

It is recommended that you maintain a strict naming convention for ACO and point source files.



Note

You must use Quick Builder to define points that reference arrays.



Caution

Do not run **bbpnt** if point building is already in progress on the server.

The syntax for this utility is:

```
bbpnt acofile [options]
```

where

acofile

The ACCOL ACO file from which the points will be extracted. The ACO extension is not required.

options

Option	Description
-o <i>pntfile</i>	Output point source file. The default is acofile.pnt . The .pnt extension does not need to be specified.
-l	Ignore local/global flag and extract all ACCOL signals form the ACO file.
-r <i>rtunum</i>	Controller number to which the points are assigned. The default is 1.
-m <i>string</i>	Mask string. String containing up to twenty 0s and 1s indicating which positions in the signal name should be copied to the point name. Positions not specified in the mask string will be included in point names. The default will be all characters in signal name to be included up to the maximum point name length.

Option	Description
<code>-s hrnum</code>	Starting character position in the signal name as stored in the ACO file for the point name. The 16 character point name is extracted from the signal name starting at this position. Defaults to the first character position, 1.
<code>-a code</code>	Area code. A 2-character code specifying the area to which the points will be added. The default is no area code.
<code>-p pntnum</code>	Point number. Starting point number for all types of points. The default is 1.
<code>-v</code>	Verbose. Print out extra information for debugging.

Example

```
bbpnt load3
Extract all global signals from load3.aco and put them in load3.pnt.
bbpnt load3 -l
Extract all signals (local and global).
bbpnt load3 -r 3
Assign all points to controller number 3.
bbpnt dpc.aco -r 3 -a n1 -p 500 -o rtu003.pnt
Extract global signals from controller number 3 from dpc.aco and put them in
rtu003.pnt. Set the area of all points to N1 and start point numbering at 500.
```

Applicable analog signals in the ACO file will produce output for the point definition file. What is produced in the point definition file depends on the contents of the ACO file. For example, A1SOURCE and A1DESTIN entries are only produced for analog alarm signals that have one of their alarm limits assigned to another signal. As much relevant information as can be extracted from the ACO file will be put into the point definition file.

Example

```
DEL Point_name
ADD Point_name ANAnnn analog
RANGE Point_name 0 100.0
PVSOURCE Point_name rrr signal_name
OPSOURCE Point_name rrr signal_name
OPDESTIN Point_name rrr signal_name
MDDESTIN Point_name rrr signal_name
```

```

PVPERIOD Point_name 60
OPPERIOD Point_name 60
A1SOURCE Point_name rrr signal_name
A1DESTIN Point_name rrr signal_name
A1PERIOD Point_name 60
A2SOURCE Point_name rrr signal_name
A2DESTIN Point_name rrr signal_name
A2PERIOD Point_name 60
A3SOURCE Point_name rrr signal_name
A3DESTIN Point_name rrr signal_name
A3PERIOD Point_name 60
A4SOURCE Point_name rrr signal_name
A4DESTIN Point_name rrr signal_name
A4PERIOD Point_name 60
A1NAME Point_name AL1
A2NAME Point_name AL2
A3NAME Point_name AL3
A4NAME Point_name AL4
ALMLIM1 Point_name limit 6 0
ALMLIM2 Point_name limit 7 2
ALMLIM3 Point_name limit 8 1
ALMLIM4 Point_name limit 9 3

```

Applicable logical signals in the ACO file will produce the following output for the point definition file. The output will be in the following form:

Example

```

DEL Point_name
ADD Point_name STAnnnn status
RANGE Point_name 0.0 1.0
STATEDES Point_name OFF ON
PVSOURCE Point_name rrr signal_name
OPSOURCE Point_name rrr signal_name
OPDESTIN Point_name rrr signal_name
MDESTIN Point_name rrr signal_name
PVPERIOD Point_name 60
OPPERIOD Point_name 60

```

Customizing point source files

Point source files generated by **bbpnt** can be customized using a text editor if required. The next step is to import the point build files into Quick Builder. See Quick Builder's help for detail on importing point files.

After the points have been imported into Quick Builder, they can be downloaded to the server.

Importing the point build files into Quick Builder

Point build files generated by **bbpnt** can be imported into Quick Builder and amended. For example, you might want to change the Scan Period entries and perhaps add comments for each point or attach algorithms.

Configuring alarms for signal data

Alarms are used to update point parameters and are the quickest way of transmitting data over the network. Alarms can only be configured for points built on signal data.

Use alarms to:

- Update point parameters.
- Quickly transmit data over the network.
- Reduce periodic scanning.
- Store as events in order to retain Bristol Babcock alarm timestamp information. (The Sequence of Events (SOE) file is used for this purpose.)

Reducing periodic scanning with alarms

Place a status point parameter on a slow scan period (300 seconds) and configure the signal in the node to alarm on a change of state.

Retaining timestamp information

An event report entry includes the timestamp received in the alarm report to a resolution of one millisecond. If an alarm value is used to update a process variable, and this causes an alarm to occur, the alarm will be time stamped with the system time not the time in the alarm report. The difference between these timestamps could be significant depending on the network architecture, hence the need to retain the “real” alarm time in the SOE file.

See the server *Configuration Guide* for more information on SOE configuration and SOE reports.



Note

- A point reference for the alarm must exist if an SOE entry is to be produced.
 - Alarms must be enabled for the point if an SOE entry is to be produced.
 - The “extended alarm format” (that has signal inhibit and alarm inhibit information) is not supported.
-

Defining points that reference arrays using Quick Builder



Caution


Disable the Bristol Babcock channel on the server before downloading points from Quick Builder.

Entering an address for a point addressing an array

For source and destination addresses the format for a Bristol Babcock controller address is:

ControllerName Location

Part	Description
<i>ControllerName</i>	The name of the Bristol Babcock controller.
<i>Location</i>	The location in the controller where the value is recorded. In the case of an Array Address see “Array address” on page 35. In the case of a Signal Address, you use the bbpnt utility, see “Defining points that reference signals” on page 31.

If you would like help with the address location, you can use the Address Builder. To display the Address Builder, click  next to **Address**. For details, see the help.

Array address

For points referencing arrays, definitions are done completely within Quick Builder. The location syntax for a point addressing an array is:

ArrayNumber Row Column

Part	Description
<i>ArrayNumber</i>	The array number— must be in the range 1 to 255
<i>Row</i>	The row number
<i>Column</i>	The column number—must be in the range 1 to 255

Valid point addresses

Valid point addresses specific to the Bristol Babcock interface that can be defined for the server point types are shown. Note the difference between signal and array addressing.

Address	Controller type Signals	Controller type Arrays
Analog Point		
PVSOURCE	Yes	
SPSOURCE	Yes	
SPDESTIN	Yes	
OPSOURCE	Yes	Yes
OPDESTIN	Yes	Yes
MDSOURCE		
MDDESTIN	Yes	
AxSOURCE	Yes	Yes
AxDESTIN	Yes	Yes
Status Point		
PVSOURCE	Yes	Yes
OPSOURCE	Yes	Yes
OPDESTIN	Yes	Yes
MDSOURCE		
MDDESTIN	Yes	
Accumulator Point		
PVSOURCE	Yes	Yes

Point configuration errors

When downloading to the server the errors reported specific to the Bristol Babcock are:

Error	Reason
Too many fields	Check file for unexpected field.
Controller type not supported	Check that hardware was built correctly.
Signal name is too long	Check the full signal name is less than or equal to 20 characters.
Invalid Bristol Babcock array number	Check the array number is in the range 1 to 255.
Invalid Bristol Babcock array column number	Check the column number is in the range 1 to 255.

Optimizing scanning performance

All point parameters which reference Bristol Babcock data should be assigned a scan period and be on periodic scanning. This scan period can be quite long (for example, 300 seconds).

Take into account network structure when assigning scan periods. The network restrains scanning frequency, especially to remote nodes, and aspects like baud rate, poll period, and network level must be taken into consideration. For more information see the *Bristol Babcock Network 3000 Communications User Guide*.

Periodic scanning uses the Remote Database (RDB) mechanism for retrieving data.

Scan rates for auxiliary parameters must be no faster than 60 seconds.

Reporting by Exception

If the node supports this feature it can be used to reduce traffic on the network.

Signals can be configured on RBE to report when the value changes by a specified deadband value. The RBE messages have the same priority as Remote Database (RDB) messages. Therefore, any critical signals should be configured to alarm. Alarms have the highest priority.



Note

Avoid configuring status signals to use the alarm system as well as the RBE system. This is unnecessary duplication.

Understanding Polling

To receive data from a Bristol Babcock node it must be polled. This makes the frequency of polling very significant in terms of speed of data movement around a Bristol Babcock network.

The server will, by default, poll all top-level controllers every 2 seconds. This polling is complemented by:

- An additional poll that is issued for each acquisition request (that is, if a response is expected, a poll is also issued).
- An immediate poll if NAK is received from the node. (NAK means that the node needs polling.)
- Continuous polling (up to a limit; default 8) while data remains in the node.

Bristol Babcock scan packets

Four types of scan packet are built for an Bristol Babcock interface:

- **Hardware Diagnostic**—one scan per controller every 60 seconds to verify communications integrity with the controller.
- **Exception Poll**—controllers are polled at the poll period.
- **Periodic Data Acquisition Scan**—one per scan packet (arrays only).
- **Periodic List Data Acquisition Scan**—one per scan packet (signals only).

A Bristol Babcock scan packet may consist of up to:

- 38 signals, or
- 59 array addresses

To be in a scan packet, points must reside:

For signals:

- in the one server controller
- have the same scan period

For arrays:

- in the one server controller
- have the same scan period
- data must reside in consecutive elements of the array (in rows)

The scan packets built on the server can be listed using the utility **lisscn** (list scan). Listing scan packets helps verify the scanning strategy. See the *Configuration Guide* for your server for usage of **lisscn**.

Defining report by exception parameters

If Report By Exception is being used for any controller then the initialization data must be specified in Quick Builder. These parameters are always downloaded to the node, and will always override any parameters set when the load was built.



Caution

Be careful not to set RBE_PERIOD too low initially as the communications system may be flooded with reports if there are rapidly changing signals on RBE. Leave at the default value until the network is stable.

Server and Station tasks for Bristol Babcock

4

This chapter describes tasks for the Bristol Babcock controller that you perform either on the server or from any Station.

For:	Go to:
Testing communications with the server	page 42
Troubleshooting scanning errors	page 43
Forcing reinitialization of point address	page 44

Testing communications with the server

A Bristol Babcock diagnostic utility, **bbtst**, is included as part of the server software. This enables communications between the server and the Bristol Babcock device to be tested after channel and controller definitions are downloaded.

Before testing:

- 1 Set up controllers.
- 2 Connect all cables.
- 3 Define channels and controllers using **bbhdw** and Quick Builder and download the definitions to the server without errors.
- 4 Ensure the channel is out of service before using the test utility.

To run the test utility:

- 1 At the Command Line, type **bbtst** and press ENTER.
- 2 Follow the directions as prompted.

The device serial interface transmit and receive LEDs flash during transactions.

If any errors are encountered, review the channel and controller definitions in Quick Builder and make sure they match the **bbhdw** output.

After you verify that the server is communicating with the Bristol Babcock controllers you can configure points—see “Defining points that address Bristol Babcock” on page 30.

Troubleshooting Bristol Babcock scanning errors

If the Point Detail display for a point shows a bad value (indicated by inverse video), the point might be built with an address that is syntactically valid but not configured in the controller.

The controller responds to a request to read this address with a NAK message. Note that NAK messages received in response to a read request by the server do not contribute to the error count of the controller or channel.

NAK messages received in response to a write request by the server result in an operator message being sent to the Station as well as contributing to the controller's error count.

Any NAK messages received are printed in the server error log (which can be viewed via the Server Diagnostics Program Group).

If A-NAK messages occur, check the relevant point address to ensure there are no references to addresses in the controller that are not actually configured within the controller.

Forcing initialization of point addresses

The server maintains addresses that correspond to signal names. When periodic scanning or Reporting by Exception is initialized, signal names are used until the addresses have been determined. From then on, all communication messages use addresses to reduce the message size.

If the load changes, it is necessary to reinitialize the signal addresses. This is done automatically, but can be forced using the **padrst** utility.

To manually force reinitialization:

- 1 At the Command Line, type:
padrst nnn and press ENTER.

Where *nnn* is the controller.

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CONTENTS

Getting Started

1

This reference describes how to set up, configure, and test Bristol Babcock OpenBSI controller communications with the server. It also contains detailed information for defining the controller using Quick Builder.

The following table lists the steps for connecting and configuring a Bristol Babcock OpenBSI controller. Complete each step before commencing the next step.

Steps:	Go to:
Connect and set up the Bristol Babcock controller according to the controller's user manual's instructions.	
Install OpenBSI tools on the server	page 11
Configure Bristol Babcock nodes using OpenBSI utilities	page 13
Use Quick Builder to define channels.	page 18
Use Quick Builder to define controllers	page 20
Download channel and controller definitions to the server	
Enable channels and test communications	page 34
Troubleshoot communication errors	page 35
Define points with Quick Builder	page 24

Support and Documentation for Bristol Babcock OpenBSI

Bristol Babcock OpenBSI Models Supported

Generally, the server supports any device that communicates via the Bristol Babcock Synchronous Asynchronous communication protocol (BSAP) and fits in the OpenBSI architecture (except ControlWave devices).

The server supports the following Bristol Babcock models:

- DPC 3330

The server supports the following version of the OpenBSI API:

- For information about supported devices and related documentation, see the Software Change Notice or the Software Release Bulletin.

The server does not support the following version of the OpenBSI API:

- v5.2 (issues have been identified with Alarm and RBE communication)



Note

The Bristol Babcock OpenBSI interface is not qualified with the Bristol Babcock ControlWave series. These use an extended signal naming scheme which is not fully supported by the server. There are also known issues with Alarm and RBE communications.

The server OPC interface should be used for communication with the ControlWave series.

Other Documentation for Bristol Babcock OpenBSI

The following document describes the address space of all the devices supported by this interface in great detail. It also provides information about the physical configuration of the controllers. Reading this document is also useful when installing the interface.

- *DPC 3330 Instruction Manual*

The following documents might also be useful when installing and configuring the DPC 3330:

- *Network 3000 Communication Application Programmer's Reference*
- *Bristol Babcock ACCOL Reference and OpenBSI Utilities Binders*
- *ACCOL II Interactive Compiler (AIC) Manual*
- *ACCOL II Reference Manual*

From Honeywell:

- *Installation Guide*
- *Hardware and Point Build Reference*

Bristol Babcock OpenBSI-specific Terms

ACCOL

Advanced Communications & Control Oriented Language

API

Application Programming Interface

BB

Bristol Babcock

BSI

Bristol Systems Interface

LocalView

Bristol Utility for configuring RTU over a serial connection

NetView

Bristol Utility for configuring RTU over an Ethernet connection

NRT

Node Routing Table. Configuration table for network topology.

PPP

Point to Point Protocol

RBE

Report By Exception

RDB

Remote DataBase

RTU

Remote Terminal Unit

Bristol Babcock OpenBSI Controller Setup

2

This chapter describes how to set up a Bristol Babcock OpenBSI controller.

For details about:	Go to:
Supported architectures	page 10
Install OpenBSI Tools on the server.	page 11
Connect all cables.	page 12
Configure Bristol Babcock nodes using OpenBSI utilities.	page 13
Configure OpenBSI to start as a Windows Service	page 15

Architectures

The following architectures are possible for Bristol Babcock OpenBSI:

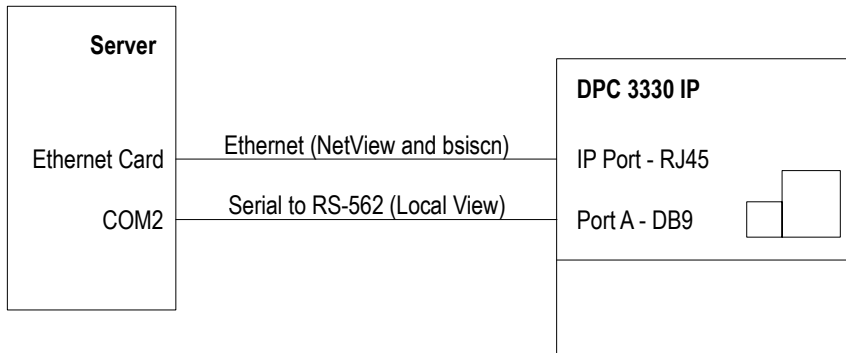
- Ethernet using Internet Protocol
- PPP using Internet Protocol
- Serial connection (direct cable)
- Serial connection (Terminal Server)

Only Internet Protocol has been qualified for a redundant server configuration. Serial connections are only supported for non-redundant servers.

The RS-562 connection is between a serial port on the server and the serial interface on the Bristol Babcock device. The BSAP protocol is fully described in the Network 3000 Communications Application Programmer’s Reference.

The OpenBSI interface requires that all connections are defined and configured with the OpenBSI tools. These connections are transparent to the server. See Bristol Babcock OpenBSI Utilities for details on configuring communications.

Figure 1 Bristol Babcock OpenBSI Interface System Architecture



Installing OpenBSI Tools on the Server

Some OpenBSI Tools are required to run on the server platform. These are:

- LocalView (configures network address)
- Workbench (produces ACCOL load file)
- BSAP to IP Setup (maps a Terminal Server port to a local COM port)
- NetView (configures RTU, produces NRT, downloads ACCOL load)
- DataView (reads signal values from RTU)

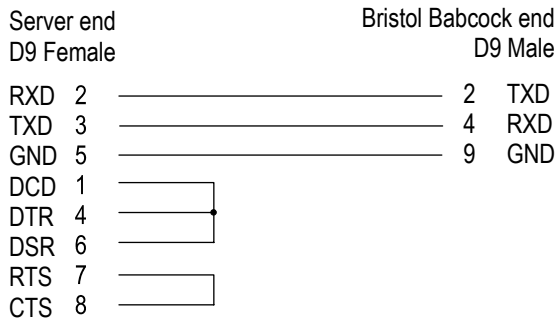
Install these tools in `\openBSI`. OpenBSI tools can be started from the Windows Explorer or a command prompt from any working folder, for example `\openBSI\NetView`, `\openBSI\DataView`. Opening a saved configuration file will start the appropriate tool.

The OpenBSI tools must be used to configure all Bristol Babcock hardware. Once this is done, use Quick Builder to configure the server hardware and points.

Connecting Cables

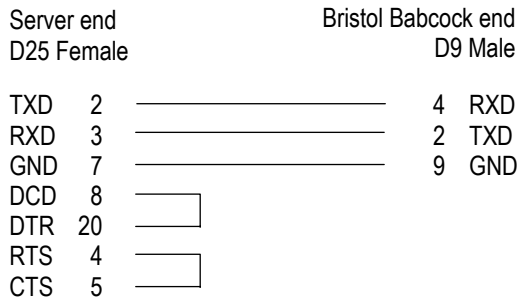
LocalView uses a local cable connection to the DPC Port on the Bristol Babcock node. “RS-562 connect using D9 to D9” on page 12 shows the pinouts for an RS-562 connection to a server-end D9 serial port. The IP DPC 3330 uses a RS-562 9-pin D connector.

Figure 2 RS-562 connect using D9 to D9



“RS-562 connect using D9 to D9” on page 12 shows the pinouts for an RS-562 connection to a server-end D25 serial port.

Figure 3 RS-562 connect using D9 to D9



Configuring the Bristol Babcock Node

Configuring the Network Address

A bootstrap process is required to configure the network address for the Bristol Babcock node. This is achieved by using **LocalView** to set up the communication ports. This is done before you download an ACCOL load to the Bristol Babcock device. See the OpenBSI Utilities manuals for instructions on using **LocalView**.

To configure and download a Bristol Babcock node:

- 1 Use **Workbench** to create the load.
- 2 Use **NetView** to create the node configuration. Set the load file to that created in Step 1.
- 3 Use **LocalView** to configure the communication ports. Set the node configuration to that created in Step 2. Once the network address configuration has been saved to the node, the node must be reset.
- 4 Use **NetView** for further configuration, and download the load file to the node.



Note

Step 3 is the bootstrap process.

Defining the Network

Once the network address for the node has been configured and downloaded, and the node has been reset, **NetView** can be used for additional configuration tasks.

NetView contains the network topology, and generates the Node Routing Table (NRT). Every IP node in the network can be configured from a single instance of **NetView**.



Note

LocalView requires a direct cable connection to the Bristol Babcock node. **NetView** can connect over a standard Ethernet network, and can be used in conjunction with other OpenBSI utilities.

Changing the Network Address

NetView can be used to change the communication port details of an existing configured RTU, including the RTUs IP configuration. See the OpenBSI Utilities manuals for details of using **NetView**.

To change the network configuration of a Bristol Babcock node:

- 1 Start **NetView**, sign in for configuration changes, select the RTU, and select **RTU > RTU Comm. Config** from the right-mouse button menu.
- 2 Click **Get RTU** to upload the current RTU communication port configuration.
- 3 Change the communication configuration as desired.
- 4 Click **Send/Save** to send the new configuration to the RTU.
- 5 Click **Close**.
- 6 In **NetView**, select the RTU, right-click to display the floating menu and then select **Properties**.
- 7 Change the Primary and/or Secondary IP Address as required, click **OK**.
- 8 Reset the RTU. When the RTU has completed its startup sequence, use **NetView** to download its load file again.



Note

If the IP address of the RTU is changed, the change will only take effect when the RTU is reset. The RTU properties in **NetView** must be changed before downloading the load file again.

Starting OpenBSI as a Windows Service

The Bristol Babcock OpenBSI interface requires the OpenBSI driver to be running before the server is started. The OpenBSI Tools include a utility that will start OpenBSI as a Windows service. From a Command Prompt, run the following command:

```
c:\OpenBSI> bsauto -install
```

This installs OpenBSI as a service, which is then configured to start automatically on system startup.

To set the OpenBSI service to start automatically:

- 1 **Control Panel > Administrative Tools > Services**
- 2 Select **Open BSI Automatic Startup**
- 3 From the **Action** menu select **Properties**
- 4 Set **Startup Type** to **Automatic** and click **OK**

OpenBSI should now start as a service on system startup.



Note

Running OpenBSI as a service uses the default NetView configuration file `c:\acco1\current.ndf`. Custom configuration filenames are not currently supported.

Bristol Babcock OpenBSI Controller Configuration and Addressing

3


This chapter describes how to configure a Bristol Babcock OpenBSI controller using Quick Builder.

For details about:	Go to:
Defining a Bristol Babcock OpenBSI channel	page 18
Defining a Bristol Babcock OpenBSI controller	page 20
Defining an address for a point parameter value	page 24
Optimizing scanning performance	page 30

Defining a Bristol Babcock OpenBSI Channel

You need to define a channel for the connection the server uses to communicate with Bristol Babcock OpenBSI controllers.

To define a channel using Quick Builder:

- 1 Click  to open the Add Items dialog box.
- 2 Select channel from **Add Items**.
- 3 Select Bristol Babcock OpenBSI from **Type**.
- 4 Specify the Main tab property values. See “Bristol Babcock OpenBSI Channel Main Properties” on page 18.

Bristol Babcock OpenBSI Channel Main Properties

The Main tab defines the basic properties for a Bristol Babcock OpenBSI channel.


Property	Description
Name	The unique name of the channel. A maximum of 10 alphanumeric characters (no spaces or double quotes).
Description	A description of the channel. 30 characters maximum, including spaces.
Marginal Alarm Limit	<p>The communications alarm marginal limit at which the channel is declared to be marginal. When this limit is reached, a high priority alarm is generated. A channel barometer monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer increments by 2 or more, depending on the error and decrements for each good call.</p> <p>To calculate an acceptable limit, multiply the square root of the number of controllers on the channel by the Marginal Alarm Limit defined for those controllers. (Normally, you specify the same value for all controllers on a channel). For example, if there are 9 controllers on the channel and their Marginal Alarm Limit is set to 25, the value would be [3 is square root] x 25= 75.</p>

Property	Description
Fail Alarm Limit	<p>The communications alarm fail limit at which the channel is declared to have failed. When this barometer limit is reached, an urgent alarm is generated.</p> <p>Set this to double the value specified for the channel Marginal Alarm Limit.</p>
Exception Poll Period	<p>The default value is 5 seconds. All controllers will be put on an exception poll for the scan period closest to this value. For more information see, “Optimizing Scanning Performance” on page 30.</p>
Item Type	Shows the channel type.
Last Modified	Shows the date of the most recent modification to this channel’s property details.
Last Downloaded	This shows the date that the item was last downloaded to the server.
Item Number	<p>The unique item number currently assigned to this item. You can change the item number if you need to match your current server database configuration. The number must be between 1 and the maximum number of channels allowed for your system.</p>

Defining a Bristol Babcock OpenBSI Controller

You need to define a controller to describe each Bristol Babcock RTU on a channel. Separate controllers must be defined in the server to address signal data and array data. See “Bristol Babcock Controller Types” on page 22 for more information.

To define a controller using Quick Builder:

- 1 Click  to open the Add Items dialog box.
- 2 Select controller from **Add Items**.
- 3 Select **bristol babcock openBSI** from **Type**.
- 4 Specify the Main tab property values. See “Bristol Babcock OpenBSI Controller Main Properties” on page 20.

Bristol Babcock OpenBSI Controller Main Properties

The Main tab defines the basic properties for a Bristol Babcock OpenBSI controller.

Property	Description
Name	The unique name of the controller. A maximum of 10 alphanumeric characters (no spaces or double quotes). For LAN connected controllers, the name must not contain underscore (_) characters. This name is used to look up the controller in NetView if you do not specify a Node Name .
Description	(Optional) A description for this controller. A maximum of 30 characters, including spaces.
Channel Name	The name of the channel on which the controller communicates. You need to have already defined the channel in order for it's name to appear in the list.
Marginal Alarm Limit	The communications alarm marginal limit at which the controller is declared to be marginal. When this value is reached, a high priority alarm is generated. This limit applies to the controller barometer which monitors the total number of requests to the controller and the number of times the controller did not respond or response was incorrect. The barometer increments by 2 or more, depending on the error and decrements for each good call. The default value is 25.

Property	Description
Fail Alarm Limit	The communications alarm fail limit at which the controller is declared to have failed. When this value is reached, an urgent alarm is generated. Set this to double the value specified for the controller Marginal Alarm Limit .
Controller Type	The controller type, either: <ul style="list-style-type: none"> • SignalsOnly • ArraysOnly For more information see “Bristol Babcock Controller Types” on page 22.
Node Name	Sixteen character node name assigned via the Bristol Babcock NetView software program.
Transaction Timeout	Transaction table timeout in seconds. Default is 60. This timeout value is the length of time that the server will wait for an RDB response. It should be set to the worst case RDB round trip time between the server and the controller. This will be affected by poll periods of intermediate nodes, baud rates and so on.
Sync Enable	Enables daily time synchronization of the controller to the server. The default is <code>Enable</code> .
Sync Time	Synchronization time for the Controller. Default is zero. This value is the number of minutes after midnight that time synchronization is triggered.
Item Type	Shows the controller’s type.
Last Modified	Shows the date of the most recent modification to this channel’s property details.
Last Downloaded	This shows the date that the item was last downloaded to the server.
RDB Security Level	This property is only visible if SignalArray is selected as the Controller Type. RDB security level. Default setting is 15. Not normally changed.
RBE Scan Rate	This property is only visible if SignalArray is selected as the Controller Type. RBE scan period in tenths of seconds. Default is 300.
RBE Scan Slice	This property is only visible if SignalArray is selected as the Controller Type. RBE scan slice parameter. Default is 1.

Property	Description
RBE Stop Xmit	This property is only visible if SignalArray is selected as the Controller Type. RBE stop transmit count. Default is 10.
RBE Timeout	This property is only visible if SignalArray is selected as the Controller Type. RBE timeout between successive wait_init messages in tenths of seconds. Default is 600.
RBE Inhibit	This property is only visible if SignalArray is selected as the Controller Type. Check to Inhibit use of Bristol Babcock report by exception messages.
Alarm Inhibit	This property is only visible if SignalArray is selected as the Controller Type. Check to Inhibit use of Bristol Babcock alarm messages.
SOE Inhibit	This property is only visible if SignalArray is selected as the Controller Type. Check to Inhibit insertion of Bristol Babcock alarms into the Sequence of Events file.
No RBE Init Reports	This property is only visible if SignalArray is selected as the Controller Type. Flag to skip RBE initialization. RDB initialization is then required to resolve MSD to point addresses.
Item Number	The unique item number currently assigned to this item. You can change the item number if you need to match your current server database configuration. The number must be between 1 and the maximum number of channels allowed for your system.

Bristol Babcock Controller Types

Data within a Bristol Babcock device is divided into two types—signals and arrays. Separate controllers must be defined in the server to address signal data and array data.

Each controller type has addressing limitations as indicated:

Controller Type	Server Addressable Range
Signals	Up to 1927 signals per server controller
Arrays	Up to 5461 array elements per server controller

If this array addressing capability is not adequate, extra server controllers can be configured to access the array data. There is a maximum of one server signal controller per physical Bristol Babcock controller.


Defining a Bristol Babcock OpenBSI Address for a Point Parameter Value

Entering an Address

For source, and destination addresses the format for a Bristol Babcock OpenBSI controller address is:

ControllerName Location

Part	Description
<i>ControllerName</i>	The name of the Bristol Babcock OpenBSI controller.
<i>Location</i>	The location in the controller where the value is recorded. See “Location Syntax” on page 24.

If you would like help with the address location, you can use the Address Builder. To display the Address Builder, click  next to **Address**. For details, see the help.

Location Syntax

The format for the location is:

Address

Part	Description
Address	The address of the point parameter. See “Signal Address” on page 24 or “Array Address” on page 26.

Signal Address

For points referencing signals, definitions are currently done within Quick Builder. The location syntax for a point addressing a signal is:

SignalName [USER_LIST=*userList*]

where:

Part	Description
<i>SignalName</i>	The signal name, which must be 1 to 20 alphanumeric characters.

Part	Description
<i>UserList</i>	The number of the BB RTU Signal List which contains this <i>SignalName</i> . A scan packet will be created to read the entire Signal List. <i>UserList</i> is a number between 1 and 255. Every point referencing the <i>SignalName</i> should have the <i>UserList</i> definition included.

Configuring Alarms for Signal Data

Alarms are used to update point parameters and are the quickest way of transmitting data over the network. Alarms can only be configured for points built on signal data.

Use alarms to:

- Update point parameters.
- Quickly transmit data over the network.
- Reduce periodic scanning.
- Store as events in order to retain Bristol Babcock alarm timestamp information. (The Sequence of Events (SOE) file is used for this purpose.)



Note

Frequent alarms do impact the periodic scanning of the system, and can cause increased network traffic. Alarms should not be used for signals that are changing frequently.

Reducing Periodic Scanning with Alarms

Place a status point parameter on a slow scan period (300 seconds) and configure the signal in the node to alarm on a change of state.

Retaining timestamp information

An event report entry includes the timestamp received in the alarm report to a resolution of one millisecond. If an alarm value is used to update a process variable, and this causes an alarm to occur, the alarm will be time stamped with the system time not the time in the alarm report. The difference between these timestamps could be significant depending on the network architecture, hence the need to retain the “real” alarm time in the SOE file.

See the server *Configuration Guide* for more information on SOE configuration and SOE reports.

**Note**

- A point reference for the alarm must exist if an SOE entry is to be produced.
- Alarms must be enabled for the point if an SOE entry is to be produced.
- The “extended alarm format” (that has signal inhibit and alarm inhibit information) is not supported.

Array Address

For points referencing arrays, definitions are done completely within Quick Builder. The location syntax for a point addressing an array is:

ArrayNumber Row Column

where:

Part	Description
<i>ArrayNumber</i>	The array number—must be in the range 1 to 255.
<i>Row</i>	The row number—must be in the range 1 to 255.
<i>Column</i>	The column number—must be in the range 1 to 255.

Valid Point Addresses

Valid point addresses specific to the Bristol Babcock interface that can be defined for the server point types are shown. Note the difference between signal and array addressing.

Address	Controller Type Signals	Controller Type Arrays
Analog Point		
PVSOURCE	Y	
SPSOURCE	Y	
SPDESTIN	Y	
OPSOURCE	Y	Y
OPDESTIN	Y	Y
MDSOURCE		
MDDESTIN	Y	
AxSOURCE	Y	Y
AxDESTIN	Y	Y
Status Point		
PVSOURCE	Y	Y

Address	Controller Type Signals	Controller Type Arrays
OPSOURCE	Y	Y
OPDESTIN	Y	Y
MDSOURCE		
MDDESTIN	Y	
Accumulator Point		
PVSOURCE	Y	Y

Data Format

Bristol Babcock analog values are all stored as single precision (4 byte) IEEE floating point values.

Bristol Babcock logical values are all one-bit.

String signals are not supported by the Bristol Babcock OpenBSI interface as the server does not support the string data type.

The correlation between Bristol Babcock Signal types and server point types is given in the following table.

Signal Type	Server Point Type	Format	Range
Analog	Analog	IEEEFP (4 byte)	single precision floating point
Analog	Accumulator	IEEEFP (4 byte)	
Logical	Status (one bit)	Unpacked (1 byte = 1 val)	off=0x00, on=0x01
Packed Logical	<not supported>	Packed (1 byte = 8 val)	off=0, on=1
String	<not supported>	NULL terminated (65 char)	

MODE Support

The modes MAN-LSP, MAN-RSP, AUTO-LSP and AUTO-RSP will be supported.

The MAN mode will correspond to “Manual Enable” and the AUTO mode to “Manual Inhibit” in ACCOL terminology. Similarly, LSP and RSP will correspond to Control Enable and Inhibit.

The mode will be obtained from OPSOURCE address.

The MDDESTIN entry must have the same address as OPSOURCE and OPDESTIN. No MDPERIOD is required.

The Manual and Control Inhibit/Enable will be tracked via the mode parameter. The following table gives the correlation between the controller and server modes.

Controller Mode	Server Mode
Manual inhibit/control inhibit	AUTO-RSP
Manual inhibit/control enable	AUTO-LSP
Manual enable/control inhibit	MAN-RSP
Manual enable/control enable	MAN-LSP

Point Configuration Errors

When downloading to the server the errors specific to the Bristol Babcock OpenBSI are:

Error	Reason
Too many fields	Check file for unexpected field.
Controller type not supported	Check that hardware was built correctly.
Signal name is too long	Check the full signal name is less than or equal to 20 characters.
Invalid list number	Check the list number is in the range 1 to 255.
Invalid Bristol Babcock array number	Check the array number is in the range 1 to 255.
Invalid Bristol Babcock array row number	Check the row number is in the range 1 to 255.
Invalid Bristol Babcock array column number	Check the column number is in the range 1 to 255.

Optimizing Scanning Performance

All point parameters which reference Bristol Babcock data should be assigned a scan period and be on periodic scanning. This scan period can be quite long (for example, 300 seconds).

Take into account network structure when assigning scan periods, especially for limited-bandwidth IP networks, such as satellite systems.

Periodic scanning uses the Remote Database (RDB) mechanism for retrieving data.

Scan rates for auxiliary parameters must be no faster than 60 seconds.

Reporting by Exception

If the node supports this feature it can be used to reduce traffic on the network.

Signals can be configured on RBE to report when the value changes by a specified deadband value. The RBE messages have the same priority as Remote Database (RDB) messages. Therefore, any critical signals should be configured to alarm. Alarms have the highest priority.



Note

- Avoid configuring status signals to use the alarm system as well as the RBE system. This is unnecessary duplication.
 - The most efficient scanning system is to have points mainly on RDB and RBE scanning, with RTU Alarms only being used for critical conditions.
-

Understanding Polling

To receive data from a Bristol Babcock node it must be polled. This makes the frequency of polling very significant in terms of speed of data movement around a Bristol Babcock OpenBSI network.

The server will, by default, poll all controllers every 5 seconds. Each poll can receive a reply from the OpenBSI service intended for any RTU on the network.

This polling is complemented by:

- An additional poll that is issued for each acquisition request. (That is, if a response is expected, a poll is also issued.)
- An immediate poll if NAK is received from the node. (NAK means that the node needs polling.)
- Continuous polling (up to a limit; default 8) while data remains in the node.

Bristol Babcock OpenBSI Scan Packets

Four types of scan packet are built for an Bristol Babcock interface:

- Hardware Diagnostic—one scan per controller every 60 seconds to verify communications integrity with the controller.
- Exception Poll—controllers are polled at the poll period.
- Periodic Data Acquisition Scan—one per scan packet (arrays and RTU signal lists only).
- Periodic List Data Acquisition Scan—one per scan packet (signals only).

A Bristol Babcock scan packet may consist of up to:

- 38 signals
- 59 array addresses
- 1 signal list

To be in a scan packet, points must reside:

For signals:

- in the one server controller
- have the same scan period

For arrays:

- in the one server controller
- have the same scan period
- data must reside in consecutive elements of the array (in rows)

For signal lists:

- in the one server controller (one packet per signal list)

The scan packets built on the server can be listed using the utility `lisscn` (list scan). Listing scan packets helps verify the scanning strategy. See the *Configuration Guide* for usage of `lisscn`.

Defining Report by Exception Parameters

If Report By Exception is being used for any controller then the initialization data must be specified in Quick Builder. These parameters are always downloaded to the node, and will always override any parameters set when the load was built.



Caution

Be careful not to set `RBE_PERIOD` too low initially as the communications system may be flooded with reports if there are rapidly changing signals on RBE. Leave at the default value until the network is stable.

Server and Station Tasks for Bristol Babcock OpenBSI

4

This chapter describes tasks for the Bristol Babcock OpenBSI controller that you perform either on the server or from any Station.

For details about:	Go to:
Testing communications with the server	page 34
Troubleshooting scanning errors	page 35
Forcing initialization of point addresses	page 36
Using the Application Programming Interface	page 37

Testing Communications with the Server

You use the Bristol Babcock OpenBSI test utility, **bsitst**, to test communications between the server and the controller after you have downloaded your channel and controller definitions to the server database.

Before testing:

- Set up the controller
- Connect all cables
- Define the controller and channel in Quick Builder
- Download the Quick Builder definitions to the server without errors



Note

If you want the test utility to receive RBE and Alarm messages, shut down the server.

To run the utility:

- 1 Open a Command Prompt window.
- 2 Type **bsitst** and press ENTER.
- 3 Follow the directions as prompted.

The device Ethernet or serial interface transmit and receive LEDs will flash during transactions.

If any errors are encountered, review the channel and controller definitions in Quick Builder.

After you verify that the server is communicating with the Bristol Babcock controllers you can configure points—see “Defining a Bristol Babcock OpenBSI Address for a Point Parameter Value” on page 24.

Troubleshooting Bristol Babcock OpenBSI Scanning Errors

If the Point Detail display for a point shows a bad value (indicated by inverse video), the point might be built with an address that is syntactically valid but not configured in the controller.

The controller responds to a request to read this address with an A-NAK message. Note that NAK messages received in response to a read request by the server do not contribute to the error count of the controller or channel.

NAK messages received in response to a write request by the server result in an operator message being sent to the Station as well as contributing to the controller's error count.

Any NAK messages received are printed in the server error log (which can be viewed via the Server Diagnostics Program Group).

If NAK messages occur, check the relevant point address to ensure there are no references to addresses in the controller that are not actually configured within the controller.

Forcing Initialization of Point Addresses

The server maintains addresses that correspond to signal names. When periodic scanning or Reporting by Exception is initialized, signal names are used until the addresses have been determined. From then on, all communication messages will use addresses to reduce the message size.

If the load changes it is necessary to reinitialize the signal addresses. This is done automatically, but can be forced using the **padrst** utility that will prompt you for the controller you wish to reinitialize.

For information about using the **padrst** utility, see the *Configuration Guide* for your server.

Using the Application Programming Interface

The OpenBSI interface provides it's own Application Programming Interface (API) for use by third-party applications. This allows the user to write an application to request and receive data from a Bristol Babcock RTU, without having to implement the communication overhead.

C Synopsis

```
#include "userbsi.h"
int c_userbsi(iTimeout, iMailSlot, iDestChn, szDestRtu,
             ucDestMex, iReqSize, bufReq, piRespSize, bufResp)
int iTimeout
int iMailSlot
int iDestChn
char *szDestRtu
unsigned char ucDestMex
int iReqSize
void *bufReq
int *piRespSize
void *bufResp
```

Argument	Description
iTimeout	(in) the amount of time to wait for a reply before returning an error (in seconds).
iMailSlot	(in) the mailslot number to use to make the request.
iDestChn	(in) the number of the channel to use to send the message to the RTU.
szDestRtu	(in) the name of the RTU to which the message will be sent. This name does not need to correspond to a controller.
ucDestMex	(in) the message exchange to which the message will be sent.
iReqSize	(in) the size of the request buffer, in bytes.
bufReq	(in) the request buffer.
piRespSize	(in/out) the size of the response buffer, in bytes.
bufResp	(in/out) the response buffer.

Description

USERBSI sends a user-created buffer to a RTU, and returns the RTU response buffer. It will return when a response is received from the RTU, or when the

timeout period has expired. It is recommended that only 5 API calls are made at any one time, to avoid impacting normal server operation.

Diagnostics

Upon successful completion, 0 is returned.

Otherwise, -1 is returned.

Internal errors and diagnostics when processing the user message will be written to the server log.

Example	See <code>bsi_apitst.c</code> for examples of creating BSAP requests and decoding BSAP responses.
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DNP3 Protocol Interface Reference

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CONTENTS

Getting started

1

This reference provides the information you need to set up, configure, and test DNP3 Protocol controller communications with the server. It also contains detailed information for defining the controller using Quick Builder.

The following table lists the steps for connecting and configuring a DNP3 Protocol controller. Complete each step before commencing the next step.

Steps:	Go to:
Connect and set up the DNP3 Protocol controller according to the controller's user manual's instructions.	page 10
Use Quick Builder to define channels.	page 14
Use Quick Builder to define controllers	page 24
Enable channels and test communications	page 42
Troubleshoot communication errors	page 43
Define points with Quick Builder	page 34

Support and Documentation for DNP3 Protocol

DNP3 Protocol V3.00 Levels Supported

The server supports the Level 1, 2 and 3 subsets of the DNP3 Protocol V3 Application Layer Protocol.

Other Documentation for DNP3 Protocol

The following DNP3 Protocol V3 documents are relevant, and should be studied before configuring a controller:

- DNP3 Protocol V3.00 Data Link Layer, version 0.02
- DNP3 Protocol V3.00 Transport Functions, version 0.01
- DNP3 Protocol V3.00 Application Layer Protocol Description, version 0.03
- DNP3 Protocol V3.00 Data Object Library, version 0.02
- DNP3 Protocol V3.00 Subset Definitions, version 2.00
- Transporting DNP V3.00 over Local and Wide Area Networks, version 1.0

These documents can be obtained from <http://www.dnp.org>.

DNP3 Protocol-specific Terms

DNP3 Protocol

Distributed Network Protocol.

DNP3 Protocol3

The interface to devices using DNP3 Protocol version 3.0.

DNP3 Protocol-LX

When applied to a device indicates that the device implements DNP3 Protocol V3.00 Application Layer protocol Level X (1, 2 or 3).

Master

A device that initiates requests to gather data or perform controls using DNP3 Protocol.

Slave

A device that gathers data or performs control operations in response to DNP3 Protocol requests from a Master, and sends response messages in return. A slave device may also generate DNP3 Protocol unsolicited responses.

DNP3 Protocol Controller Setup

2

This chapter describes how to set up a DNP3 Protocol controller.

For details about:	Go to:
Supported architectures	page 10
Communication settings	page 12

Architectures

Connect DNP3 Protocol controllers to the server in accordance with the appropriate architectural diagram.

Figure 1 DNP3 Protocol point to point serial architecture

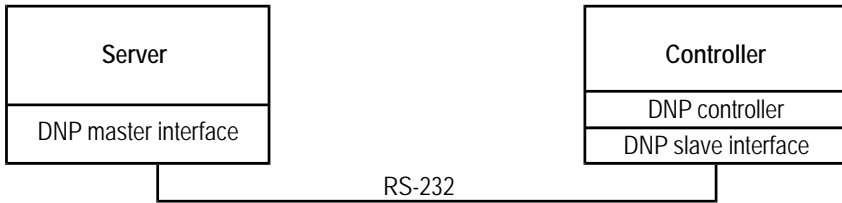


Figure 2 DNP3 Protocol redundant server serial architecture using a terminal server

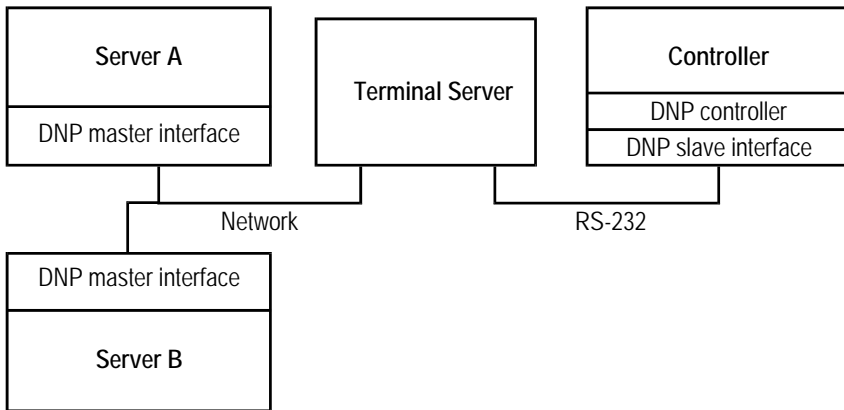
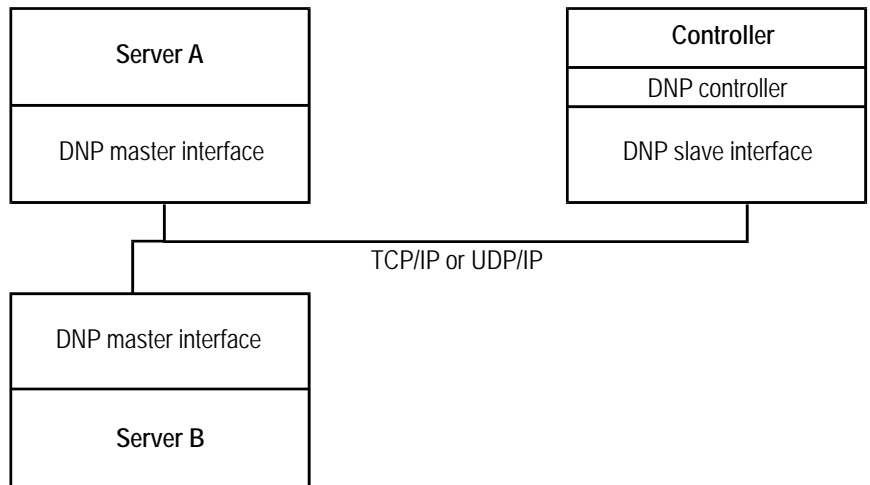


Figure 3 DNP3 Protocol redundant server network architecture



Communication settings

Serial communications settings should be the same as the terminal server or server serial port, depending on which architecture is being used.

Ethernet communications settings should be the same as those used by the server.

DNP3 Protocol controller configuration and addressing

3


This chapter describes how to configure a DNP3 Protocol controller using Quick Builder. For each configuration procedure, there is detailed information covering all supported DNP3 Protocol levels.

For details about:	Go to:
Defining a DNP3 Protocol channel	page 14
Defining a DNP3 Protocol controller	page 24
Defining an address for a point parameter value	page 34
Optimizing scanning performance	page 40

Defining a DNP3 Protocol channel

You need to define a channel for the connection the server uses to communicate with DNP3 Protocol controllers.

To define a channel using Quick Builder:

- 1 Click  to open the Add Items dialog box.
- 2 Select Channel from **Add Items**.
- 3 Select DNP3 Protocol from **Type**.
- 4 Specify the Main tab property values. See “DNP3 Protocol channel Main properties” on page 14.
- 5 Click the Port tab, and for **Port Type** select either:
 - LANVendor (if an Ethernet channel is required)
 - Serial
 - Terminal Server
 See “DNP3 Protocol Port properties” on page 17.
- 6 Specify the Redundant Port properties. See “Redundant port properties” on page 22.

DNP3 Protocol channel Main properties

The Main tab defines the basic properties for a DNP3 Protocol channel.

Property	Description
Name	The unique name of the channel. A maximum of 10 alphanumeric characters (no spaces or double quotes).
Description	A description of the channel. 30 characters maximum, including spaces.

Property	Description
Marginal Alarm Limit	<p>The communications alarm marginal limit at which the channel is declared to be marginal. When this limit is reached, a high priority alarm is generated. A channel barometer monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer increments by 2 or more, depending on the error and decrements for each good call.</p> <p>To calculate an acceptable limit, multiply the square root of the number of controllers on the channel by the Marginal Alarm Limit defined for those controllers. (Normally, you specify the same value for all controllers on a channel). For example, if there are 9 controllers on the channel and their Marginal Alarm Limit is set to 25, the value would be [3 is square root] x 25= 75.</p> <p>The default value is 25, which is the usual setting.</p>
Fail Alarm Limit	<p>The communications alarm fail limit at which the channel is declared to have failed. When this barometer limit is reached, an urgent alarm is generated.</p> <p>Set this to double the value specified for the channel Marginal Alarm Limit.</p> <p>The default value is 50, which is the usual setting.</p>
Master Address for Server A	<p>DNP3 Protocol data link address of the server on the DNP3 Protocol channel. Valid range is from 0 to 65519, and must be unique on the channel.</p> <p>In a redundant server system like that shown in “DNP3 Protocol redundant server network architecture” on page 11, Server A uses this setting for its DNP3 Protocol data link address.</p>
Master Address for Server B	<p>In a redundant server system like that shown in “DNP3 Protocol redundant server network architecture” on page 11, Server B uses this setting for it’s DNP3 Protocol data link address.</p>
Daemon Period	<p>Period in milliseconds that the DNP3 Protocol daemon looks for data from the channel (serial only) and progress any outstanding requests (serial and Ethernet). Note that the DNP3 Protocol daemon processes Ethernet data as soon as it arrives. Valid range from 5 to 30000. Default value is 50. For Ethernet it is recommended that this is set to 100.</p>
Read time per byte (S0)	<p>(Only applicable to Serial and TerminalServer port.)</p> <p>The time in milliseconds that the DNP3 Protocol daemon allows to read a single byte. Valid range from 1 to 1000 milliseconds. Default value is 30.</p>

Property	Description
Daemon Poll Timeout (U0)	<p>Period in seconds that the DNP3 Protocol daemon keeps data from the device for the DNP3 Protocol scan task before deleting it.</p> <p>Valid range from 1 to 300 seconds. Default is 60.</p>
Ethernet Connect Timeout	<p>(Applicable to LANVendor port only.)</p> <p>The time (in seconds) that the server waits when trying to establish an Ethernet connection to the device. Valid range is 1 to 999 seconds. Default value is 1.</p>
Read (U1)	<p>The time (in seconds) that the server waits for a reply from the controller for a read request. Valid range is 1 to 600 seconds. Default value is 15.</p> <p>Use the default value unless the communications line has a high error rate or if you are using modems.</p>
Class read (U2)	<p>The time (in seconds) that the server waits for a reply from the controller for a class read request. Valid range is 1 to 600 seconds. Default value is 30.</p> <p>Use the default value unless the communications line has a high error rate or if you are using modems.</p>
Diagnostic (U3)	<p>The time (in seconds) that the server waits for a reply from the controller for a diagnostic request. Valid range is 1 to 60 seconds. Default value is 5.</p> <p>Use the default value unless the communications line has a high error rate or if you are using modems.</p>
Request retry period (U7)	<p>The time (in milliseconds) that the server waits before retrying a request following a busy reply. Valid range is 5 to 10000 milliseconds. Default value is 100.</p>
Control (U4)	<p>The time (in seconds) that the server waits for a reply from the controller for a control request. Valid range is 1 to 300 seconds. Default value is 10.</p> <p>Use the default value unless the communications line has a high error rate or if you are using modems.</p>
Time Synch Read (U5)	<p>The time (in seconds) that the server waits for a reply from the controller for a time synchronization read request. Valid range is 1 to 300 seconds. Default value is 10.</p> <p>Use the default value unless the communications line has a high error rate or if you are using modems.</p>

Property	Description
Time Synch Write (U6)	The time (in seconds) that the server waits for a reply from the controller for a time synchronization write request. Valid range is 1 to 300 seconds. Default value is 10. Use the default value unless the communications line has a high error rate or if you are using modems.
Item Type	Shows the channel type.
Last Modified	Shows the date of the most recent modification to this channel's property details.
Last Downloaded	This shows the date that the item was last downloaded to the server.
Item Number	The unique item number currently assigned to this item. You can change the item number if you need to match your current server database configuration. The number must be between 1 and the maximum number of channels allowed for your system.



Note

Several of the settings described above are marked with a (Sx) or (Ux), where x is a number. To aid in the troubleshooting, error messages in the server log associated with one of these particular settings also contain the corresponding (Sx) or (Ux) text.

DNP3 Protocol Port properties

The Port tab defines the communication-related properties for a channel. The **Port Type** for a DNP3 Protocol controller can be:

- **Serial**. A serial communications interface, such as RS-232. See “Serial port properties” on page 18.
- **Terminal Server**. A communications link that enables controllers with a serial interface to be connected to a LAN. See “Terminal server port properties” on page 20.
- **LANVendor**. An Ethernet communications link using TCP/IP or UDP. See “LANVendor port properties” on page 21.

Serial port properties

**Note**

The Serial Port settings must match the settings on your communication devices.

Property	Description
Maximum Daemon Slots	<p>Each channel's link consists of a daemon process which may run out of transaction table slots if the link is overloaded, or if there are large numbers of controllers on the link.</p> <p>The number of transaction table slots in the daemon may be modified by using this setting. The range is 256 to 32767. Default value is 256.</p>
Half duplex polling	<p>If selected, only one request is outstanding on the port at any instance. When a request is in progress, subsequent requests are queued until the current request is complete or has timed out. This setting is useful if there are multiple controllers on the channel and there is at least a part of the communications pathway between the server and the controller that has ineffective flow control. If unsolicited responses are enabled, unsolicited responses from controllers are still confirmed when in this mode.</p> <p>If not selected, only one request per controller is outstanding on the port at any instance. When a request is in progress for a controller, subsequent requests for that controller are queued until the current request is complete or has timed out. If there are multiple controllers on the channel this allows multiple requests to be underway at the same time.</p> <p>By default this option is not selected.</p> <p>Note that regardless of this setting, queued requests are sent out in first in/first out order; the exception is control requests, which are always processed before other types of requests such as data acquisition, diagnostics, class polling and time synchronization.</p>
Serial Port Name	The device name of the serial port.
Baud Rate	The number of data bits per second. The default is 9600.
Number of Data Bits	The number of data bits used for transmission. The default is 8.
Stop Bits	The number of stop bits used for transmission. The default is 1.

Property	Description
Parity	The parity verification used on the port. The default is NONE.
Checksum	Set to None (default). (Each block in a DNP3 Protocol data link frame has a 16-bit CRC appended to it. The server handles this checksum by default in the data link layer.)
XON/XOFF	The type of XON/XOFF software flow control used to stop a receiver from being overrun with messages from a sender. The types are: <ul style="list-style-type: none"> • None (default) • Input (use XON/XOFF to control the flow of data on the receive line) • Output (use XON/XOFF to control the flow of data on the transmit line)
Handshaking Options	<p>For RS-232:</p> <ul style="list-style-type: none"> • Enable RTS/CTS flow control. Stops a receiver from being overrun with messages from a sender by using RTS/CTS flow control. • Detect DCD. Select if the Data Carrier Detect communication status line of the COM port requires monitoring (usually when using modem or microwave linking). When selected, the communications fails if the desired COM status line is not high—for example, on a dial-up link connection for a modem. • Detect DSR. Select if the Data Set Ready communication status line of the COM port requires monitoring (usually when using modem or microwave linking). When selected, the communications fails if the desired COM status is not achieved. <p>For RS-422 and RS-485:</p> <ul style="list-style-type: none"> • Enable Stallion RS-485 Half Duplex. Select if RS-232 to RS-485 is done using a Stallion EasyConnection adapter. • Echo (Required for Stallion RS-485 ports). Select so that the server expects the messages it sends to the port on the transmit line to be echoed back on the receive line. Select for a Stallion EasyConnection adapter or a Black Box converter.

Terminal server port properties

Property	Description
Maximum Daemon Slots	<p>Each channel's link consists of a daemon process which may run out of transaction table slots if the link is overloaded, or if there are large numbers of controllers on the link.</p> <p>The number of transaction table slots in the daemon may be modified by using this setting. The range is 256 to 32767. Default value is 256.</p>
Half duplex polling	<p>If selected, only one request is outstanding on the port at any instance. When a request is in progress, subsequent requests are queued until the current request is complete or has timed out. This setting is useful if there are multiple controllers on the channel and there is at least a part of the communications pathway between the server and the controller that has ineffective flow control. If unsolicited responses are enabled, unsolicited responses from controllers are still confirmed when in this mode.</p> <p>If not selected, only one request per controller is outstanding on the port at any instance. When a request is in progress for a controller, subsequent requests for that controller are queued until the current request is complete or has timed out. If there are multiple controllers on the channel this allows multiple requests to be underway at the same time.</p> <p>By default this option is not selected.</p> <p>Note that regardless of this setting, queued requests are sent out in first in/first out order; the exception is control requests, which are always processed before other types of requests such as data acquisition, diagnostics, class polling and time synchronization.</p>
Terminal Server TCP Host Name	The name and port number of the terminal server to which the channel is connected.
Terminal Server TCP Port No.	You can specify either a TCP host name or an IP address, but it must match the TCP host name used when you installed and internally configured the terminal server.

Property	Description
Idle Timeout	<p>The time, in seconds, the channel waits for a successful connection to the server before closing the connection.</p> <p>A value of 0 indicates that the connection is never closed.</p> <p>The idle timeout should be set to a number greater than the fastest polling period on the channel.</p> <p>This also applies to the idle timeout configured in the terminal server.</p>
Checksum	<p>The type of checksum error detection used for the port.</p> <ul style="list-style-type: none"> • None <p>Note that each block in a DNP3 Protocol data link frame has a 16-bit CRC appended to it. The server handles this checksum by default in the data link layer.</p>

LANVendor port properties

Property	Description
Maximum Daemon Slots	<p>Each channel's link consists of a daemon process which may run out of transaction table slots if the link is overloaded, or if there are large numbers of controllers on the link.</p> <p>The number of transaction table slots in the daemon may be modified by using this setting. The range is 256 to 32767. Default value is 256.</p>

Property	Description
Half duplex polling	<p>If selected, only one request is outstanding on the port at any instance. When a request is in progress, subsequent requests are queued until the current request is complete or has timed out. This setting is useful if there are multiple controllers on the channel and there is at least a part of the communications pathway between the server and the controller that has ineffective flow control. If unsolicited responses are enabled, unsolicited responses from controllers are still confirmed when in this mode.</p> <p>If not selected, only one request per controller is outstanding on the port at any instance. When a request is in progress for a controller, subsequent requests for that controller are queued until the current request is complete or has timed out. If there are multiple controllers on the channel this allows multiple requests to be underway at the same time.</p> <p>By default this option is not selected.</p> <p>Note that regardless of this setting, queued requests are sent out in first in/first out order; the exception is control requests, which are always processed before other types of requests such as data acquisition, diagnostics, class polling and time synchronization.</p>
Protocol	<p>TCP or UDP.</p> <p>Only one UDP channel can be built per system and only one redundant link can specify UDP as the transport protocol. If a second UDP link or channel is built or if another application on the same system is using UDP port 20000, a Winsock error 10049 will be reported in the log.</p>

Redundant port properties

Redundant communications relies on the controller functioning as follows:

1. Listening and responding to both ports as requested.
2. Simultaneously sending unsolicited data down both links or only sending unsolicited data down the link that most recently was used for solicited communications.


Configuring redundant ports and/or redundant servers can be complex and can vary from controller to controller. If you have problems implementing a redundant port, contact your local Honeywell representative.

Property	Description
Redundant Port Timeout Multiplier	<p>This setting can be used when link B (the non-preferred link) is slower than link A. The following timeouts on link B are multiplied by this value:</p> <ul style="list-style-type: none"> • Overall Data Link Layer timeout (D1) • Ack/link status timeout (D2) • Read time per byte (S0) • Fragment timeout (A2) • Response timeout (A3) • Read timeout (U1) • Class read timeout (U2) • Diagnostic timeout (U3) • Control timeout (U4) • Time synch read timeout (U5) • Time synch write (U6) <p>Valid range is from 1 to 100. Default value is 1.</p>

Defining a DNP3 Protocol controller

You need to define a controller to describe each DNP3 Protocol on a channel.

To define a controller using Quick Builder:

- 1 Click  to open the Add Items dialog box.
- 2 Select Controller from **Add Items**.
- 3 Select DNP3 Protocol from **Type**.
- 4 Specify the Main tab property values. See “DNP3 Protocol controller Main properties” on page 24.
- 5 Specify the DNP3 Protocol tab property values. See “DNP3 Protocol controller protocol-specific properties” on page 30.

DNP3 Protocol controller Main properties

The Main tab defines the basic properties for a DNP3 Protocol controller.

Property	Description
Name	The unique name of the controller. A maximum of 10 alphanumeric characters (no spaces or double quotes).
Description	A description for this controller. A maximum of 30 characters, including spaces.
Channel Name	The name of the channel on which the controller communicates. You need to have already defined the channel in order for it's name to appear in the list.
Marginal Alarm Limit	The communications alarm marginal limit at which the controller is declared to be marginal. When this value is reached, a high priority alarm is generated. This limit applies to the controller barometer which monitors the total number of requests to the controller and the number of times the controller did not respond or response was incorrect. The barometer increments by 2 or more, depending on the error and decrements for each good call. The default value is 25.
Fail Alarm Limit	The communications alarm fail limit at which the controller is declared to have failed. When this value is reached, an urgent alarm is generated. Set this to double the value specified for the controller Marginal Alarm Limit .

Property	Description
Device Address	DNP3 Protocol data link address of the controller on the DNP3 Protocol channel. Valid range is from 0 to 65519, and must be unique on the channel.
Level	The controller level: <ul style="list-style-type: none"> • 1 • 2 • 3 See “DNP3 Protocol controller levels” on page 29 for details.
Default Data Size	Specifies the register size to be used when not explicitly specified in the Point address. Either 16 or 32 (bits). If this option is modified and you want existing points to use the modified value, then those points must be rebuilt.
Enable SOE	Must be set if time stamped binary inputs are to be treated as SOE (Sequence of Events). By default this option is not selected. Note that if you select this option, you must also configure SOE on a point parameter basis. See “Location syntax” on page 34.
Accept Unsolicited Messages	If selected, unsolicited messages from the controller are accepted and confirmed. If not selected, unsolicited messages are ignored.
Enable Unsolicited Message Control	If selected, the server sends out enable (Function code 20) and disable (Function code 21) unsolicited message requests, depended upon the controller’s Accept Unsolicited Messages setting. Note that some controllers may not be able to correctly interpret these requests. If not selected, the sending of unsolicited messages is entirely controlled by the controller itself.

Property	Description
Enable Time Synchronization	<p>If selected, the server attempts to synchronize the controller's time when the channel is brought into service and when the controller sets IIN bit 4 in its responses. If not selected, the server never attempts to synchronize the controller's time.</p> <p>If the Enable LAN Time Synchronization option is disabled, selecting this option allows the use of the standard DNP time synchronization method. The server synchronizes the controller's time by issuing a Delay Measurement (Function code 23) request then writing a Time and Date object to the controller.</p> <p>This method of time synchronization is only recommended for serial ports due to the non-variable nature of serial communications delays (however this setting can be selected for other port types). For LANVendor ports, an alternative synchronization method can be enabled using the Enable LAN Time Synchronization option.</p>
Request Data Upon Startup	<p>If selected, the server requests all controller data (class 1, 2, 3 and 0) from the slave whenever a controller initialization occurs. By default this option is not selected.</p>
Request Status with Data	<p>If selected, all subsequent points that are built use the with status variation. By default this option is not selected.</p> <p>If this option is modified, and you want existing points to use the modified value, then those points must be rebuilt.</p>

Property	Description
Enable History Backfill	<p>Select this if binary input change with time, analog change event with time and counter change event with time objects are to be backfilled into standard history. The change values are inserted into standard history snapshots as if they were read by the server at the time of the change's timestamp.</p> <p>Warning: Standard history averages are NOT re-averaged as part of the history backfill process and should not be considered accurate for points that have history backfill configured.</p> <p>The system's history initialization percentage must also be set to 100% (that is, set sysflg (file 8), record 1, word 26 to 100).</p> <p>The maximum number of days that can be backfilled must also be defined in sysflg (file 8, record 1, word 470). Any event data older than this number of days will be discarded and will not be inserted into history. This maximum number of days must not exceed the number of days of standard history snapshots that is configured for the system.</p> <p>An alarm is raised if change data is lost due to an overflow in the controller's event buffer or an overload of the history backfill task. The priority of this alarm is defined in sysflg (file 8, record 1, word 494). Set it to 0 for a journal entry, 1 for low, 2 for high and 3 for urgent alarm priority.</p> <p>Note that if you select this option, you must also configure it on a point parameter basis. See "Location syntax" on page 34.</p> <p>By default this option is not selected.</p>
Enable LAN Time Synchronization	<p>Only applicable to LANVendor port with the Enable Time Synchronization option enabled.</p> <p>This option uses the LAN/WAN DNP time synchronization method (see the <i>Transporting DNP V3.0 over Local and Wide Area Networks</i> document). If selected, the server synchronizes the controller's time by issuing a Record Current Time (Function code 24) request then writing a Time and Date at Last Recorded Time object to the controller upon receipt of a Null response. If not selected, the standard method of time synchronization will be issued.</p>

Property	Description
IP Address 1	<p>(Only applicable to LANVendor port.)</p> <p>If redundant ports are configured, this should be the IP address of the device on link 1. If this is not specified, the controller name is used as the host name with an “A” appended to it.</p> <p>If redundant ports are not configured, this should be the IP address of the device. If this is not specified, the controller name is used as the host name.</p>
IP Address 2	<p>(Only applicable to LANVendor port.)</p> <p>The redundant IP address of the device. If this is not specified, the controller name is used as the host name, with a “B” appended to it.</p>
Class 0	<p>Specifies the frequency at which class 0 data is polled. Valid range is 0-30000 seconds. Default is 0.</p> <p>Class 0 requests all data on the device, so for large devices this period should be at least 60 seconds, and it is recommended that it be greater than 3600 seconds.</p> <p>To ensure that data is always processed in chronological order, whenever a request for class 0 data is to be made, a request for class 1, 2, 3 and 0 data (in that order) is actually made.</p>
Class 1	<p>Specifies the frequency at which class 1 data is polled. Valid range is 0-30000 seconds. Default is 0.</p>
Class 2	<p>Specifies the frequency at which class 2 data is polled. Valid range is 0-30000 seconds. Default is 0.</p>
Class 3	<p>Specifies the frequency at which class 3 data is polled. Valid range is 0-30000 seconds. Default is 0.</p>
Item Type	Shows the controller’s type.
Last Modified	Shows the date of the most recent modification to this channel’s property details.
Last Downloaded	This shows the date that the item was last downloaded to the server.
Item Number	The unique item number currently assigned to this item. You can change the item number if you need to match your current server database configuration. The number must be between 1 and the maximum number of channels allowed for your system.

DNP3 Protocol controller levels

Controller and Point configuration needs to be tailored according to the DNP3 Protocol controller level.

Level 1

For slave devices implementing DNP3 Protocol V3 Application Layer protocol level 1. This is the simplest DNP3 Protocol level, typically a small end-device such as a meter or relay, whose I/O is local to the device. Typically, level 1 devices rely on either RBE or unsolicited methods for sending data to master devices. The following controller and point configuration items are relevant:

- Point periods are irrelevant.
- Point object type, variation (such as data size and status flag) and object address are relevant.
- Reads of all controller static data (class 0) occur at the configured rate. This is inefficient, it would be better to have infrequent class 0 polls, and rely on class 1/2/3 polling or unsolicited data for more frequent updates.
- Reads of all controller event data (classes 1,2,3) at the configured rate. This requires the slave assigning all required objects to the required classes.
- Unsolicited data may be sent by the controller.
- Performing point control is inefficient because class 0 reads are the only way to confirm the control was successful.

Level 2

For slave devices implementing DNP3 Protocol V3 Application Layer protocol level 2. This is typically a large Intelligent Electronic Device (IED) or a small Remote Terminal Unit (RTU). Typically, the I/O is local to the device. Level 2 controllers are treated like level 1 controllers with the following exceptions:

- Point periods are relevant. Periodic polling for static data (for the entire object type) at the rate determined by the fastest point scanning configured for any Point referencing that object type. Class 1/2/3 polling and unsolicited data are still far more efficient than this method.
- Class 0 reads would typically be disabled (set to 0), as they are inefficient compared to the above method.

Level 3

For slave devices implementing DNP3 Protocol V3 Application Layer protocol level 3. This is typically a medium size slave device, such as a RTU or Data Concentrator. Level 3 controllers are treated like level 2 controllers with the following exceptions:

- DNP3 Protocol controller read requests are for a block of objects, of the same type and period. This method replaces entire object type read used for level 2 devices. Note that for some controllers it may be necessary for all objects in the block to exist on the controller. That is, it may be necessary for DNP3 Protocol objects to be built directly.
- Performing point control is efficient because single object reads can be performed to confirm the control was successful.

DNP3 Protocol controller protocol-specific properties

The DNP3 Protocol tab defines the DNP3 Protocol-specific properties for a DNP3 Protocol controller.

Property	Description
Overall timeout (D1)	Time allowed for any complete Data link layer request. This is an overall timeout and should be set to allow for any RESET, REQUEST LINK STATUS, USER DATA or other frames that may need to be sent in order to successfully send the data from the upper layer. Valid range from 1-30000 milliseconds. Default is 800.
Ack/link status timeout (D2)	Time allowed for a data link ACK or LINK STATUS RESPONSE frame to be received. Valid range from 1 to 30000 milliseconds. Default is 500.
Number of reset retries (D3)	(Only available when Acknowledgements is selected.) Number of times a data link RESET frame is resent in the event of an error. Valid range from 0 to 100 retries. Default is 0.
Number of data retries (D4)	(Only available when Acknowledgements is selected.) Number of times data link USER DATA frame is resent in the event of an error. Valid range from 0 to 100 retries. Default is 0.

Property	Description
Send RESET upon receipt of a NACK with clear DFC (D7)	<p>(Only available when Acknowledgements is selected.)</p> <p>If selected, immediately after receiving a NACK frame with the DFC bit set to 0 the server sends a RESET LINK frame to the slave. The server interprets the receipt of such a NACK frame as meaning the slave was restarted and is waiting for it's receiving link to be reset for the first time.</p> <p>If not selected, the receipt of a NACK frame with the DFC bit set to 0 causes the server to behave as the same as if the DFC bit is set to 1. That is, the configured number of REQUEST LINK STATUS tests will be attempted. If the slave responds with a DFC set to 0 during these tests, the data link layer transaction will be continued. Otherwise, the data link layer transaction will be failed.</p> <p>Default is selected.</p>
Send NACK with clear DFC upon receipt of a set FCV before RESET (D6)	<p>Allows for when the server receives a frame from the slave with the FCV bit set to 1 before the server has received a RESET frame in it's current in-service session.</p> <p>If selected and this situation occurs, the server sends a NACK frame to the slave with a DFC bit set to 0. This should trigger the slave into sending a RESET frame to the master.</p> <p>If not selected and this situation occurs, the server does not send a response to the received frame.</p> <p>Although not discussed in the DNP3 Protocol V3 Data Link Layer specification, this option may need to be selected to ensure proper recovery when the channel or controller is taken in and out of service.</p> <p>Selected by default.</p>
Acknowledgments	<p>If selected, the slave is requested to acknowledge data link layer USER DATA frames that are sent to it by returning an ACK frame. If set, a RESET frame is sent when required to in order to synchronize the FCV bit or the master and the slave.</p> <p>If not selected, then the slave is not requested to confirm USER DATA frames.</p> <p>Selected by default.</p> <p>Data link acknowledgements are not to be configured for Ethernet devices. It is also recommended that data link acknowledgements not be used for serial devices.</p>

Property	Description
Number of link status tests (D5)	(Only available when Acknowledgements is selected.) Number of times a REQUEST LINK STATUS frame is sent if the slave indicates that it cannot receive any more frames. Valid range from 0 to 100 retries. Default is 3.
Fragment timeout (A2)	Time allowed for an application fragment to be received after the initial request or after receipt of the previous fragment within the response. Valid range from 1-30000 milliseconds. Default is 6000.
Response timeout (A3)	Time allowed for a complete application response (possibly multiple fragments) to be completely received. Valid range from 1-30000 seconds. Default is 12.
Number of request retries (A4)	Number of times an application layer request is retried in the event of an error. Valid range from 0-100 retries. Default is 0.
Control Function	This is the default setting for new points built on the controller and can be changed on an individual point basis. It sets which Application layer function(s) are used to control Control Relay and Analog Output blocks. Selecting Direct Operate causes the Direct Operate function to be used. Selecting Select-Operate causes each control operation to use the Select function followed by the Operate function. Default is Direct Operate.
Pulse width	This is a controller-wide setting and cannot be modified on an individual point basis. It is the width of the pulse in milliseconds. Valid range is from 0 to 10000 milliseconds. Default value is 200. Note that this property is not the same as the Pulse Width property on the Control tab of a status point.
Control Operation	This is the default setting for new points built on the controller and can be changed on an individual point basis. This setting sets whether to use Pulse On or Latch On/Latch Off when controlling Control Relay Output Blocks. Note that if the Pulse setting is used without the use of Trip and Close Relays, the control operation attempts to pulse the corresponding Unpaired Momentary Relay. Default is Latch. Note that this property is not the same as the Pulse Width property on the Control tab of a status point.

Property	Description
Use Trip/Close Relays	<p>This is the default setting for new points built on the controller and can be changed on an individual point basis. This setting sets whether to use the Trip and Close relay pair when controlling Control Relay Output Blocks.</p> <p>If the Trip and Close relay pair is to be used for a point, the control operation for that point must be set to Pulse. This can be accomplished by setting the Control Operation property for the controller to Pulse by default, or by specifying PU on the point's address line.</p> <p>When the Trip and Close relay pair is used, the Trip relay is pulsed on when the point is controlled to the low state and the Close relay is pulsed on when the point is controlled to the high state.</p>

**Note**

Several of the settings described above are marked with a (Dx) or (Ax), where x is a number. To aid in the troubleshooting, error messages in the server log associated with one of these particular settings also contain the corresponding (Dx) or (Ax) text.

In order for the changes to settings on the DNP3 Protocol tab (except control options) to take effect after they have been downloaded to the server, the channel and/or controller should be taken out of service and then put back into service.

Defining a DNP3 Protocol address for a point parameter value

Entering an address

For source, and destination addresses the format for a DNP3 Protocol controller address is:

ControllerName Location

Part	Description
<i>ControllerName</i>	The name of the DNP3 Protocol controller.
<i>Location</i>	The location in the controller where the value is recorded. See “Location syntax” on page 34.

If you would like help with the address location, you can use the Address Builder. To display the Address Builder, click next to **Address**. For details, see the help.

Location syntax

The format for the location is:

ObjectType ObjectAddress [DataSize] [Control Options | HistoryBackfill] [B: BitNumber | DataFormat]

Part	Description
<i>ObjectType</i>	Object type is the DNP3 Protocol object type being specified. See “Point parameter addressing options” on page 36, and “DNP3 Protocol objects options” on page 37.
<i>ObjectAddress</i>	Specifies the object address of the specified object type. Range is 0-32767.
<i>DataSize</i>	Specifies the data size of analog and counter objects, either 16 or 32 (bits). This value overrides the data size specified in the controller configuration. Short floating point analog variations may also be specified. 16, 32 or FP are valid values. Long floating point analog variations are NOT supported.

Part	Description
<i>Control Options</i>	<p>Applicable to BOC and AOC only:</p> <ul style="list-style-type: none"> • DO for use of Direct Operate control function or • SO for use of Select - Operate control functions <p>Applicable to BOC only:</p> <ul style="list-style-type: none"> • TC for use of Trip and Control Relay Pair or • NOTC for non-use of Trip and Control Relay Pair • LA for Latch On/Latch Off control operations or • PU for Pulse On control operations <p>Note: If the above settings are not specified when the point is first built, the control options for the point are set to those of the point’s controller.</p> <p>These settings are separate from the Pulse Width setting found on the Control tab of a status point.</p>
<i>HistoryBackfill</i>	<p>HS can be added to the address to enable any source parameter to have its history backfilled. The source parameter must also have standard history configured.</p> <p>History backfill is performed regardless of the state of history gating points configured for the parameter.</p> <p>History Backfill is only supported for status and analog point types.</p> <p>History Backfill must also be configured for the controller. See “DNP3 Protocol controller Main properties” on page 24.</p>
<i>BitNumber</i>	<p>The valid range is 0 (default) to 15, where 0 is the least significant bit.</p> <p>The number of bits read is implied by the point type. Analog point parameters read up to 16 bits. Status point parameters read 1, 2, or 3 consecutive bits.</p>
<i>DataFormat</i>	<p>The data format acronym or starting bit number, depending on how you want the value to be read:</p> <ul style="list-style-type: none"> • “Data format for scaling” on page 37. • “Data format for reading raw values without scaling” on page 38. • “Data format for reading mode values” on page 39. <p>User-defined data formats are also supported as documented in the <i>Configuration Guide</i>.</p>

Example

Analog point

PV source: DNPCT 1 AI 163 FP HIS IEEEFP

SP destination: DNPCT_1 AO 162 16 U16B

SP destination: DNPCT_1 AO 200 16 SO U16B

Mode destination: DNPCT_1 BO 163

Status point

PV source: DNPCT_1 BI 201

OP destination: DNPCT_1 BOC 201 PU TC D0

Accumulator point

PV source: DNPCT_1 Co 171 C16

Point parameter addressing options

Note that all DNP3 Protocol devices may not accept the options described here. See the device’s DNP3 Protocol device profile document for more details.

Point type	Point parameter	QB entry for Object	Data size (bits)	Bit # applic.	Data format	History backfill applic.
Status	PV/OP source	BI/SOE/BO	n/a (always 1)	No	none	Yes
		AI/AO/Co	16/32	Yes	non-scaled	Yes
	OP destin	BOC	n/a (always 1)	No	none	No
		AI/AO/Co	16/32	Yes	non-scaled	No
Accumulator	PV source	AI/AO/Co	16/32	No	non-scaled	No
Analog	PV/SP/OP/A1-A4 source	Co	16/32	No	all	Yes
		AI/AO	16/32/FP	No	all	Yes
	SP/OP/A1-A4 destin	Co	16/32	No	all	No
		AOC	16/32/FP	No	all	No
	Mode source	BI/BO	n/a (always 1)	No		Yes
		AI/AO/Co	16/32	No	mode	Yes

Point type	Point parameter	QB entry for Object	Data size (bits)	Bit # applic.	Data format	History backfill applic.
	Mode destin	BOC	n/a (always 1)	No		No
		AOC	16/32	Yes	mode	No

DNP3 Protocol objects options

Object type	Object type description	DNP3 Protocol object type #s	Variation description
BI	Binary Input	1	With or without status.
SOE	Binary Input Change	2	With or without status, with timestamps.
BO	Binary Output	10	With status.
BOC	Control Relay Output Block	12	
Co	Counters Request static counters, but both static and event Counters accepted from the controller.	20	16-bit or 32-bit, with or without status. Delta counters are NOT supported.
AI	Analog Input Request static analog inputs, but both static and event analog inputs are accepted from the controller.	30	16-bit, 32-bit or short floating point, with or without status.
AO	Analog Output	40	16-bit, 32-bit or short floating point.
AOC	Analog Output Block	41	16-bit, 32-bit or short floating point.

SOE configuration

The SOE enable flag must be set for the controller, and status points must have their PV source address specify SOE as the object type. Do not build two point/parameters where one uses the SOE object type and the other uses the BI object type with the same object address.

Data format for scaling

You can scale point parameter values with a data format if they have addresses in the Input Register and Holding Register data tables. Select the format that corresponds to the counts that have been set in the controller register.

Data format	Description	Scaled
C16	0 to 65535	No
HALFWD	0 to 65535	No
U100	0 to 100	Yes
U1023	0 to 1023	Yes
U4095 (default)	0 to 4095	Yes
S9999	-9999 to 9999	Yes
U9999	0 to 9999	Yes
U9998	0 to 9998	Yes
U999	0 to 999	Yes
U8B	0 to 255	Yes
U14B	0 to 16383	Yes
U15B	0 to 32767	Yes
U16B	0 to 65535	Yes
S8B	-128 to 127	Yes
S16B	-32768 to 32767	Yes
S32B	-2,147,483,648 to 2,147,483,647	No
U32B	0 to 4,294,967,296	No
IEEEFP	IEEE single precision floating point range	No
REVWD	0 to 65535	No
U3BCD	0 to 999 in binary coded decimal	Yes
U4BCD	0 to 9999 in binary coded decimal	Yes
LOWWORD	0 to 65535	No
HIGHWORD	0 to 65535	No



Note

If auxiliary parameters have a data format type that requires scaling they take the same range as the PV.

Data format for reading raw values without scaling

To read less than 16 bits without scaling, enter the starting bit number (1 to 15).

If you are not using scaling, the point range is still used for PV indicator bar height only (the PV indicator bar is on the Point detail display on Station).

Data format for reading mode values

By default, modes are 1-bit values unless the “mode” keyword is specified; then modes are 4 bits wide.

Optimizing scanning performance

The maximum amount of data that can be acquired from a controller is influenced by the rate of sending scan packets to the controller. You should gain an understanding of DNP3 Protocol scan packets in order to optimize data acquisition performance, and maximize the amount of data acquired with each scan packet.

You can list scan packets that have been built with the list scan utility, **lisscn**. Listing scan packets helps verify the scanning strategy. For details, see the *Configuration Guide*.

The ability to optimize scanning depends upon the DNP3 Protocol controller type used:

- Level 1 controllers should use RBE (class polls) and/or unsolicited responses to achieve efficient scanning. Class 0 polling should be carried out at a low frequency or avoided completely.
- Level 2 controllers should also use RBE and unsolicited responses to achieve efficient scanning. Point parameters should not be polled at a high frequency because it causes read requests for complete object types to be sent to the device, at a rate equal to the fastest Point frequency configured for that object type.
- Level 3 controllers allow for efficient scanning by combining DNP3 Protocol object types into blocks (see the following table) of DNP3 Protocol objects with similar scanning periods.

DNP3 Protocol object type	DNP3 Protocol level 3 maximum block size
BI /B0/S0E	233
16 bi t AI /A0/Co	127
32 bi t AI /A0/Co	85

Server and Station tasks for DNP3 Protocol

4

This chapter describes tasks for the DNP3 Protocol controller that you perform either on the server or from any Station.

For details about:	Go to:
Testing communications with the server	page 42
Troubleshooting scanning errors	page 43

Testing communications with the server

You use the DNP3 Protocol test utility, **dnptst**, to test communications between the server and the controller after you have downloaded your channel and controller definitions to the server database.

Before testing:

- Set up the controller
- Connect all cables
- Define the controller and channel in Quick Builder
- Download the Quick Builder definitions to the server without errors
- Ensure the channel is out of service

To run the utility:

- 1 Open a Command Prompt window.
- 2 Type **dnptst** and press ENTER.
- 3 Follow the directions as prompted.

Troubleshooting DNP3 Protocol scanning errors

If the Point Detail display for a point shows a bad value (indicated by inverse video), then the point might be built with an address that is syntactically valid but not configured in the controller. If this is the case refer to the Event Log, where there should be an event describing the problem.



Note

- Some DNP3 Protocol devices return an error if a block of objects is requested from it and one of the objects in the block doesn't exist. In this case the valid objects may not even be returned. The solution is to ensure all DNP3 Protocol objects in the controller are in contiguous addresses.
 - If a controller sends data to the server as unsolicited data, or in response to a class poll request, and the size variation differs from that specified in a point/parameter address, then that point/parameter is not processed. The solution is to specify the correct size (16 or 32) in the point/parameter address.
 - If scanning errors occur in DNP3 Protocol level 2 devices then all points built on the controller are processed to BAD.
 - The DNP3 Protocol daemon may run out of transaction table slots if the channel is overloaded or if there are any large numbers of controllers on the channel. The channel will be failed when this occurs and may be recovered by periodic diagnostic requests. In such overload conditions, the increasing of point scan periods and/or the decreasing of class poll periods should be considered to reduce channel loading.
 - The number of transaction table slots can be increased using the settings on the channel's Port tabs. See "DNP3 Protocol Port properties" on page 17.
-

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GE Fanuc Series 90 Interface Reference

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Getting started

1

This reference provides the information you need to set up, configure, and test GE Fanuc controllers.

Steps for connecting and configuring a GE Fanuc controller.

Complete each step before commencing the next step.

Step:	Go to:
Connect the controller to the server	page 13
Define channels using Quick Builder	page 18
Define controllers using Quick Builder	page 20
Download channel and controller definitions to the server	
Test communications	page 30
Define controller points using Quick Builder	page 23

Support and documentation for GE Fanuc

Device support

For information about supported devices, see the *Software Change Notice* or the *Software Release Bulletin*.

Series 90-30 (IC693 controllers) compatibility

The interface is compatible with IC693CPU364 CPU module and IC693CMM321 communications module.

The HCT used by the interface is not compatible with the IC693CPU374 CPU module and there are no known corrective actions to enable communications with this module. Honeywell is working with GE Fanuc in an attempt to resolve this issue. Any changes in status will be communicated by way of BE-AWARE notice and/or in HINTS. Possible alternatives are:

- Use an older GE Fanuc module that is compatible with the HCT (that is, IC693CPU364 or IC693CMM321).
- Use a newer PACSystems controller that can be forced to be compatible with the HCT (see “PACSystems RX3i and RX7i compatibility” on page 6).
- Use a combination of the OPC Client Interface and the GE Fanuc OPC Server for GE SRTP instead of this interface.
- Use Modbus TCP instead of this interface.

Series 90-70 (IC697 controllers) compatibility

The interface is compatible with IC697CMM741 and IC697CMM742 communications modules.

PACSystems RX3i and RX7i compatibility

For these controllers using firmware release 2.57 or later, the Ethernet interface of the controller can be configured to run in HCT compatibility mode. This allows the interface to ignore SRTP header errors that were not detected in previous Series 90 products. Instructions for making this change can be found by searching for “chct_comp” in the GE Fanuc publication *TCP/IP Ethernet Communications for PACSystems* (GFK-2224).

GE Fanuc documentation

GE Fanuc documentation is available from the GE Fanuc GlobalCare Web site at <http://globalcare.gefanuc.com/>. A GE Fanuc Single Sign On Login is required to access this Web site.

Series 90-30 (IC693 controllers) documentation

GFK-0356 *Series 90-30 PLC Installation and Hardware Manual*
 GFK-1541 *TCP/IP Ethernet Communications for the Series 90 PLC User's Manual*

Series 90-70 (IC697 controllers) documentation

GFK-0262 *Series 90-70 Programmable Controller Installation Manual*
 GFK-1541 *TCP/IP Ethernet Communications for the Series 90 PLC User's Manual*
 GFK-1527 *Series 90-70 Enhanced Hot Standby CPU Redundancy User's Guide*

PACSystems RX3i documentation

GFK-2314 *PACSystems RX3i Hardware and Installation Manual*
 GFK-2224 *TCP/IP Ethernet Communications for PACSystems User's Manual*

PACSystems RX7i documentation

GFK-2223 *PACSystems RX7i Installation Manual*
 GFK-2224 *TCP/IP Ethernet Communications for PACSystems User's Manual*

GE Fanuc technical support

GE Fanuc technical support is available by e-mail to support@gefanuc.com or by telephone on 800-GEFANUC. You may need a GE Fanuc GlobalCare number to obtain technical support.

For more information about GE Fanuc technical support, see <http://www.gefanuc.com/en/ToolsSupport/index.html>.

GE Fanuc setup

2

This chapter describes how to set up a GE Fanuc controller.

The tasks for setting up a GE Fanuc controller are:

For:	Go to:
Supported architectures	page 10
Connecting controllers to the server	page 13

Architecture for GE Fanuc

GE Fanuc controllers are connected to the server via an Ethernet link or links, as shown in the following figures.

Figure 1 Non-redundant channel, non-redundant controllers

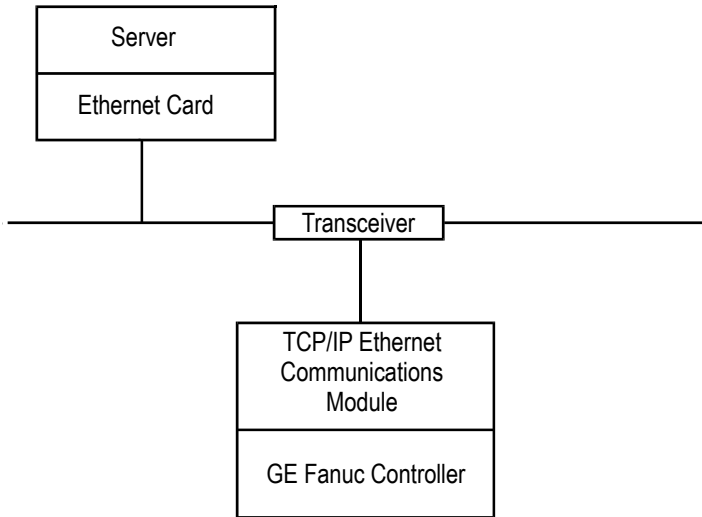


Figure 2 Non-redundant channel, redundant controller pair

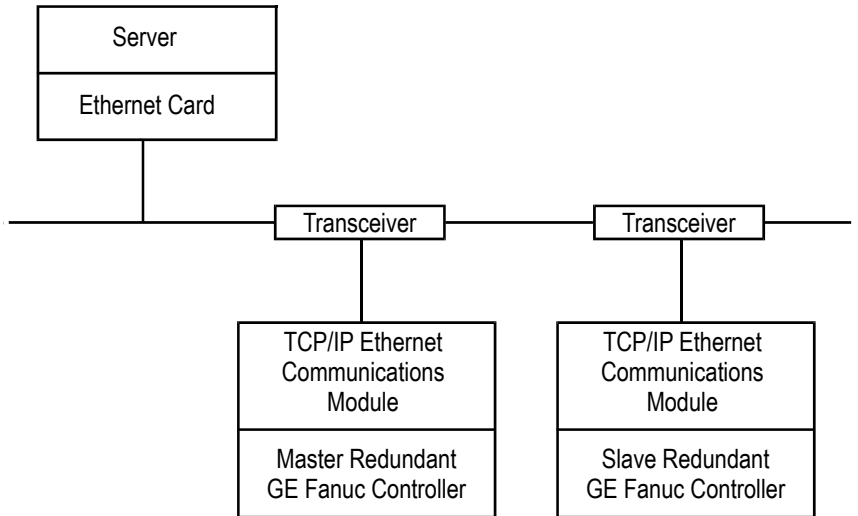


Figure 3 Redundant channel, non-redundant controllers

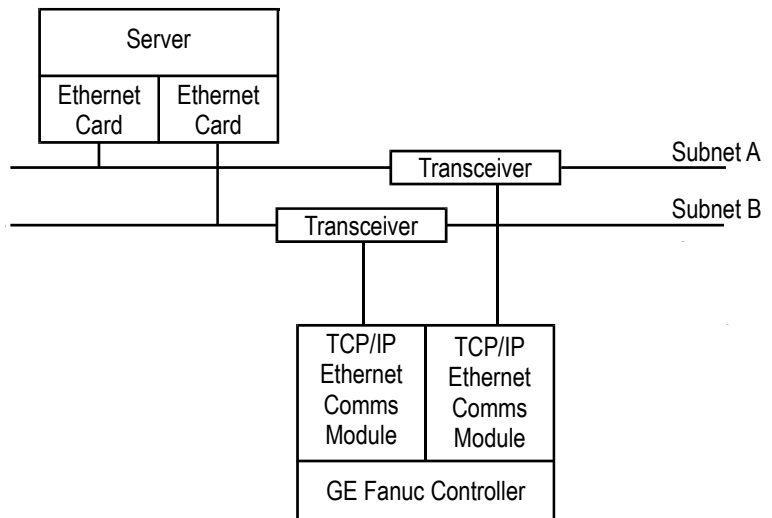
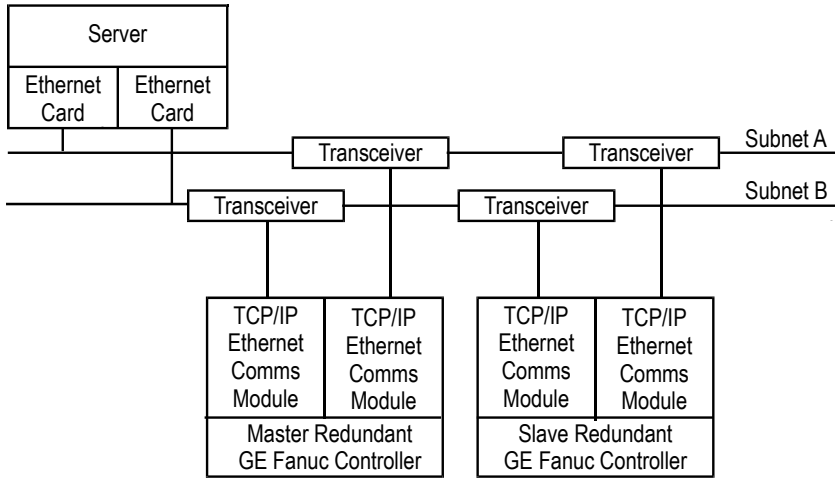


Figure 4 Redundant channel, redundant controller pair



Note

Later model TCP/IP Ethernet communications modules allow a direct 10BaseT connection and therefore no transceivers are required.

Connecting GE Fanuc controllers to the server

In setting up the Ethernet connection you need to perform the following steps to enable TCP/IP communications:

- 1 Install and configure an Ethernet communications module or modules on each controller. Note that each Ethernet controller module must be assigned an IP address. See the GE Fanuc documentation for details.
- 2 If required, install and configure redundancy hardware and/or software on each controller.
- 3 Enable the TCP/IP protocol on the server.
- 4 Connect the controller communications modules to the server via an Ethernet LAN compliant with IEEE 802.3.
- 5 Create the GEF_CFG.INI configuration file on the server. See “Setting up the configuration file” on page 13.
- 6 Specify the controller names and IP addresses in the server’s hosts file: c:\WINNT\system32\drivers\etc\HOSTS. See “Editing the server’s hosts file” on page 16.

Setting up the configuration file

In addition to defining GE Fanuc channels and controllers in Quick Builder, you must also define them in a file called GEF_CFG.INI, located in the root Windows folder on the server (for example, c:\winnt\GEF_CFG.ini).

This file must contain one entry for each channel and each Ethernet controller module. The channel entry defines how communications with the controllers on that channel are performed. The controller entries define the IP addresses that have been assigned to and configured within each controller.

If redundant channels and/or redundant controllers are to be used, an entry must appear in the GEF_CFG.INI file for each Ethernet controller module. The name of each entry consists of the controller name appended with one or two characters as detailed below.

- If redundant controllers are to be used without redundant channels as shown in “Non-redundant channel, redundant controller pair” on page 11, the master controller entry is followed by a “1”, the slave controller entry by a “2”.
- If redundant channels are to be used without redundant controllers as shown in “Redundant channel, non-redundant controllers” on page 11, the subnet A entry is followed by an “A”, the subnet B entry by a “B”.
- If redundant controllers are to be used with redundant channels as shown in “Redundant channel, redundant controller pair” on page 12, for the master

controller, the subnet A is followed by “1A”, the subnet B entry by “1B”. For the slave controller, the subnet A entry is followed by a “2A”, the subnet B entry by “2B”.

**Note**

The same names must also appear in the server’s HOSTS file.

Example

This shows the contents of a typical file for a non-redundant channel setup:

```
; This file contains addressing information required for HCT
; communications.
; Lines starting with a ; are considered comments.
; The Device Name of the controller is given in [] and cannot
; exceed 10 characters
; The IP_ADDR value is an IP Address given in dot decimal
; form.
; A space is required between device information
; The port TYPE specification must be TCPIP_ETH for TCP/IP
; communications/
```

```
; Controller 1 (called PLC1) :
```

```
[PLC1]
IP_ADDR = 203.17.161.4
```

```
; Controller 2 (Called PLC2) :
```

```
[PLC2]
IP_ADDR = 203.17.161.5
```

```
; Controller 3 (Called PLC3, non-redundant channel, redundant
controller) :
```

```
[PLC31]
IP_ADDR = 203.17.161.6
[PLC32]
IP_ADDR = 203.17.162.7
```

```
; Channel 1 (Called Series90) :
```

```
[Series90]
TYPE=TCPIP_ETH
```

```
; The following section is used to configure HCT timeout
; values.
```

```
[HCT_Timeout]
CONNECT_TIMEOUT=5000
REQUEST_TIMEOUT=2000
```

This shows the contents of a typical file for a redundant channel setup:

```
; This file contains addressing information required for HCT
```

```

; communications.
; Lines starting with a ; are considered comments.
; The Device Name of the controller is given in [] and cannot
; exceed 10 characters
; The IP_ADDR value is an IP Address given in dot decimal
; form.
; A space is required between device information
; The port TYPE specification must be TCPIP_ETH for TCP/IP
; communications/

; Controller 4 (Called PLC4, redundant channel, non-redundant
; controller) :
[PLC4A]
IP_ADDR = 203.17.161.8
[PLC4B]
IP_ADDR = 203.17.162.8
; Controller 5 (Called PLC5, redundant channel, redundant
; controller) :
[PLC51A]
IP_ADDR = 203.17.161.9
[PLC51B]
IP_ADDR = 203.17.162.9
[PLC52A]
IP_ADDR = 203.17.161.10
[PLC52B]
IP_ADDR = 203.17.162.10

; Channel 2 (Called Series90) :
[Series90]
TYPE=TCPIP_ETH
; The following section is used to configure HCT timeout
; values.
[HCT_Timeout]
CONNECT_TIMEOUT=5000
REQUEST_TIMEOUT=2000

```

Defining multiple controllers for a single physical controller

If you need to access data in a controller table beyond its default range (see “Using offsets” on page 27), you need to define more than one “logical” controller in Quick Builder for the physical controller. You must specify these logical controllers in GEF_CFG.INI.

Example This example shows the contents of GEF_CFG.INI where you have defined two controllers, PLC1reg and PLC1sta, to represent a single physical controller with an IP address of 203.17.161.4.

```
[PLC1reg]
IP_ADDR = 203.17.161.4
```

```
[PLC1sta]
IP_ADDR = 203.17.161.4
```

Editing the server's hosts file

You need to specify the controller names and IP addresses in the server's hosts file: C:\WINNT\system32\drivers\etc\hosts.

Example

```
203.17.161.4 PLC1
203.17.161.5 PLC2
203.17.161.6 PLC31
203.17.162.7 PLC32
203.17.161.8 PLC4A
203.17.162.8 PLC4B
203.17.161.9 PLC51A
203.17.162.9 PLC51B
203.17.161.10 PLC52A
203.17.162.10 PLC52B
```

GE Fanuc configuration and addressing


3

This chapter describes how to configure a GE Fanuc controller using Quick Builder.

For information about:	Go to:
Defining a GE Fanuc channel	page 18
Defining a GE Fanuc controller	page 20
Defining an address for a point parameter value	page 23
Optimizing scanning performance	page 28

Defining a GE Fanuc channel

To define a channel:

- 1 Click  to open the Add Items dialog box.
- 2 Select channel from **Add Items**.
- 3 Select GeSeries90 from **Type**.
- 4 Set the property values on the Main tab—see “GE Fanuc channel Main properties” on page 18.

GE Fanuc channel Main properties

The Main tab defines the basic properties for a GE Fanuc channel.


Property	Description
Name	The unique name of the channel. A maximum of 10 alphanumeric characters (no spaces or double quotes). This is the name you use in the GEF_CFG.INI file—see “Setting up the configuration file” on page 13.
Description	A description of the channel. A maximum of 30 alphanumeric characters, including spaces.
Marginal Alarm Limit	The communications alarm marginal limit at which the channel is declared to be marginal. When this limit is reached, a high priority alarm is generated. A channel barometer monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer increments by 2 or more, depending on the error and decrements for each good call. To calculate an acceptable limit, multiply the square root of the number of controllers on the channel by the Marginal Alarm Limit defined for those controllers. (Normally, you specify the same value for all controllers on a channel). For example, if there are 9 controllers on the channel and their Marginal Alarm Limit is set to 25, the value would be [3 is square root] x 25= 75.
Fail Alarm Limit	The communications alarm limit at which the channel is declared to have failed. When this barometer limit is reached, an urgent alarm is generated. Set this to double the value specified in Marginal Alarm Limit .

Property	Description
Item Type	Shows the type of item specified when this item was created.
Last Modified	Shows the date of the most recent modification to this channel's property details.
Last Downloaded	This shows the date that the item was last downloaded to the server.
Redundant Channel	Specifies that the server has two Ethernet cards, one of each subnet and each controller on this channel has two Ethernet communication modules installed, one of each subnet.
Item Number	The unique item number currently assigned to this item. You can change the item number if you need to match your current server database configuration. The number must be between 1 and the maximum number of channels allowed for your system.

Defining a GE Fanuc controller

You may need to define up to five “logical” controllers for one physical GE Fanuc controller; each of which represents a different area in its address space. To determine how many controllers you need to define, see “Accessing data in GE Fanuc controllers” on page 26.

To define a controller:

- 1 Click  to open the Add Items dialog box.
- 2 Select controller from **Add Items**.
- 3 Select **GeSeries90** from **Type**.
- 4 Set the property values on the Main tab. See “GE Fanuc controller Main properties” on page 20.

GE Fanuc controller Main properties

The Main tab defines the basic properties for a GE Fanuc controller.

Property	Description
Name	The unique name of the channel. A maximum of 10 alphanumeric characters (no spaces or double quotes). This is the name you use in the <code>GEF_CFG.INI</code> file—see “Setting up the configuration file” on page 13.
Description	A description of the controller. A maximum of 30 alphanumeric characters, including spaces.
Channel Name	The GE Fanuc channel on which the controller communicates with the server.
Marginal Alarm Limit	The communications alarm marginal limit at which the controller is declared to be marginal. When this limit is reached, a high priority alarm is generated. This limit is the controller barometer, which monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer is incremented by 2 or more, depending on the error and decremented for each good call. The default value is 25.

Property	Description
Fail Alarm Limit	<p>The communications alarm fail limit at which the controller is declared to have failed. When this barometer limit is reached, an urgent alarm is generated.</p> <p>Set this to double the value specified in Marginal Alarm Limit.</p>
Controller Type	<p>Specifies what type of controller data you want to access:</p> <p>0 = byte address tables 1 = word address tables</p> <p>See “Accessing data in GE Fanuc controllers” on page 26.</p>
Offset	<p>Only applicable to a Type 1 controller.</p> <p>Specifies the address offset so that the server can access addresses beyond the default range. The default offset is 0. See “Using offsets” on page 27.</p>
Master/Slave bit location details	<p>In a redundant controller configuration, these settings specify the byte and bit location of the bit that is set in the master PLC and clear in the slave PLC. See the Location Syntax for examples of how to specify the byte and bit numbers.</p> <p>For redundant controller configurations using HBR30 Hot Backup Redundancy, the byte number should be %M00128 and the bit number 3. These are the default values for these settings.</p> <p>For redundant controller configurations using Series 90-70 Hot Standby or Series 90-70 Enhanced Hot Standby, the byte number should be %S00005 and the bit number 3.</p> <p>For more information see your controller redundancy software/hardware documentation.</p> <p>This master/slave bit is read during each diagnostic scan. If it is NOT set and communications with the other controller can successfully be established, communications will be switched to the other redundant controller.</p> <p>This master/slave bit is also read immediately before sending a control request to the PLC. If it is NOT set and communications with the other controller cannot be established, the control request will be failed.</p>
Item Type	Shows the type of item specified when this item was created.

Property	Description
Last Modified	Shows the date of the most recent modification to this controller's property details.
Last Downloaded	This shows the date that the item was last downloaded to the server.
Alternate Links	<p>If specified, process and diagnostic scans are alternated between the two links if they are available (Redundant channel configuration only). If this setting is not checked, failover from the active link to the other will only occur once the active link has failed.</p> <p>In a redundant controller configuration, it is recommended that this setting be checked to enable faster master controller connection recovery.</p>
Redundant PLC	<p>Specifies that this controller consists of a redundant controller pair.</p> <p>In a non-redundant channel configuration, if an error is experienced when communicating with the current controller, then communications will be switched to the other controller.</p> <p>In a redundant channel configuration, if consecutive errors are experienced on all in service channels, then communications will be switched to the other controller.</p>
Item Number	The unique item number currently assigned to this item. You can change the item number if you need to match your current server database configuration. The number must be between 1 and the maximum number of channels allowed for your system.


Defining a GE Fanuc address for a point parameter

Entering an address

For **PV Source Address**, **Source Address**, and **Destination Address** the format for an GE Fanuc controller address is:

ControllerName Location

Part	Description
<i>ControllerName</i>	The name of the GE Fanuc controller.
<i>Location</i>	The address within the controller where the value is stored. See “Location syntax” on page 23.

If you would like help when defining an address, click  next to **Address** to display Address Builder. For details, see the help.

Location syntax

The format for the location is:

%ttnnnnn [DataFormat]

Part	Description
<i>%tt</i>	The ID of the data table. See “Accessing data in GE Fanuc controllers” on page 26.
<i>nnnnn</i>	The address within the table. For a Type 0 controller, this is a byte address. For a Type 1 controller, this is a word address.
<i>DataFormat</i>	The data format acronym. See: <ul style="list-style-type: none"> “Data format for scaling” on page 24 “Data format for reading raw values” on page 25 “Data format for reading bits” on page 25 “Data format for a mode” on page 26 User-defined data formats can also be used as detailed in the <i>Configuration Guide</i> .

Example To address word 1 of the Register table:
%R00001

Data format for scaling

To scale point parameter values with addresses in the register tables, use the following data formats:

Format	Description	Counts
U100	0 to 100 percent	0 to 100
U1023	unsigned 0 to 1023	0 to 1023
U4095	unsigned 0 to 4095	0 to 4095
S9999	signed -9999 to 9999	-9999 to 9999
U9999	unsigned 0 to 9999	0 to 9999
U9998	unsigned 0 to 9998	0 to 9998
U999	unsigned 0 to 999	0 to 999
U8B	8-bit unsigned	0 to 255
U14B	14-bit unsigned	0 to 16383
U15B	15-bit unsigned	0 to 32767
U16B	16-bit unsigned	0 to 65535
S8B	8-bit signed	-128 to 127
S16B	16 bit signed	-32768 to 32767
U3BCD	3 digit binary coded decimal	0 to 999
U4BCD	4 digit binary coded decimal	0 to 9999
S32BS	32-bit signed binary little-endian	-2147483648 to 2147483647
U32BS	32-bit unsigned binary little-endian	0 to 4294967296
S32BSB	32-bit signed binary big-endian	-2147483648 to 2147483647
U32BSB	32-bit unsigned binary big-endian	0 to 4294967296

Example Analog point for input temperature control:
%R3 S16B

Data format for reading raw values

To read point parameter values without scaling, use the following data formats.

Format	Description	Counts
C16 (default)	16-bit unsigned	0 to 65535
HALFWD	upper half word	0 to 65535
IEEEFP	single precision floating point	
REVWD	reverse word	0 to 65535
S32B	32-bit signed binary little-endian	-2147483648 to 2147483647
U32B	32-bit unsigned binary little-endian	0 to 4294967296
S32BB	32-bit signed binary big-endian	-2147483648 to 2147483647
U32BB	32-bit unsigned binary big-endian	0 to 4294967296



Note

The 32-bit data formats are only valid for values in the Register table (%R) and use two consecutive words. For example, address %R0010 IEEEFP actually uses words %R0010 and %R0011.

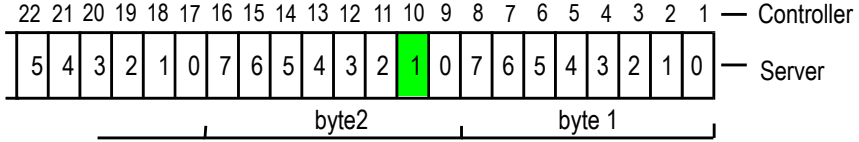
Data format for reading bits

Bits can be read from both the word tables (R, AI, or AQ) and the byte tables (I, Q, M, T, S, SA, SB, SC or G.) The server does not support direct bit addressing. Direct bit addresses must be converted to word and bit offset format.

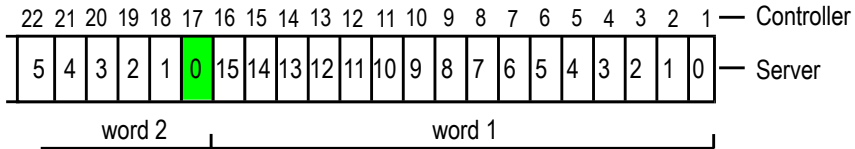
- Valid bit offsets within the register (word) tables range from 0 to 15.
- Valid bit offsets within the byte tables range from 0 to 7.

Example

A bit address of %I10 converted to a byte address is %I0002 1



A bit address of %R17 converted to a word address is %R00002 0



Data format for a mode

Enter a data format of MODE to configure a mode for a mode parameter (MD) source or destination address.

A single bit is accessed with the following meaning:

Mode	Server Value	Controller Value
Auto	1	0
Manual	0	1

The single bit that is accessed can also be specified. For example, %R00010 3 MODE.

Accessing data in GE Fanuc controllers

The server accesses data from the following reference tables in GE Fanuc controllers.

Quick Builder provides two types of controller to access specific types of data: Type 1 (word) and Type 0 (byte).

To access data beyond the default range for a Type 1 controller, see “Using offsets” on page 27.

Table ID	Reference Table	Range	Address Mode	Controller Type
%R	Register	1 to 4196	word	1
%AI	Analog Input	1 to 2048	word	1
%AQ	Analog Output	1 to 2048	word	1
%I	Discrete Input	1 to 1536	byte	0
%Q	Discrete Output	1 to 1536	byte	0
%M	Discrete Internal	1 to 1536	byte	0
%T	Discrete Temporary	1 to 32	byte	0
%S	System Fault	1 to 16	byte	0
%SA	Special Contacts A	1 to 16	byte	0
%SB	Special Contacts B	1 to 16	byte	0
%SC	Special Contacts C	1 to 16	byte	0
%G	Genius Seamless	1 to 960	byte	0

Using offsets



Note

Offsets are only applicable to Type 1 controllers.

Offsets allow the server to access addresses in the %R, %AI, and %AQ reference tables beyond the default ranges specified in “Accessing data in GE Fanuc controllers” on page 26.

If you need to access addresses beyond the default ranges, you need to define more than one controller, and specify a suitable offset for each controller.

The following table shows the addressable ranges for the allowed offsets.

Table ID	Offset			
	0	1	2	3
%R	1 - 4096	4097 - 8192	8193 - 12288	12289 - 16384
%AI	1 - 2048	2049 - 4096	4197 - 6144	6145 - 8192
%AQ	1 - 2048	2049 - 4096	4197 - 6144	6145 - 8192

For example, to address registers %R100-140 and %AI3000 to 3010, you need to configure two Type 1 controllers. You would configure the controller for the %R table with an offset of 0, and the controller for the %AI table with an offset of 1.

Optimizing scanning performance

Sequential addresses with the same scan period are grouped together into scan packets. If the number of scan packets becomes too great, scanning performance is impaired. To minimize the number of scan packets:

- Use a small number of available scan periods for all your point definitions.
- Closely block the registers read by the server and ensure that all addresses within a block (controller Type 0, 512 bytes; controller Type 1, 512 words) have the same scan period.
- Ensure there are no small packets being scanned at fast rates.

You can verify your scanning strategy by using the List Scan utility, **lisscn**, to list the scan packets you have built.

Reducing the number of accessed data tables

You can reduce the number of scan packets by combining data within a controller's data tables. For example, instead of addressing registers in %R, %AQ and %AI, you can program the controller to transfer values from %AI and %AQ tables to the %R table, so that you only have to scan the %R table.

Server tasks for GE Fanuc

4

This chapter describes tasks for the GE Fanuc that you perform either on the server or from any Station.

For information about:	Go to:
Testing communications with field devices	page 30
Troubleshooting point configuration errors	page 31

Testing GE Fanuc communications

You use the diagnostic utility, **g90tst**, to test communications between the GE Fanuc controller and the server.

To run the utility:

- 1 Open a Command Prompt window.
- 2 Type **g90tst** and press ENTER.
- 3 Follow the directions as prompted.

Troubleshooting point configuration errors

Incorrectly configured points can reveal themselves in one of two ways.

- Errors while downloading Quick Builder point definitions to the server
If this occurs, read the log file generated and correct the errors. Points might be configured with illegal configuration details (using an unknown table ID, using the wrong controller type for the table, and so on). This may cause problems when definitions are downloaded.
- Errors when scanning
If you build points with addresses that are valid but not configured in the controller, they are not reported as errors until the server tries to acquire data. They are evident on the Point Detail display on Station which will show a bad value (indicated by inverse video). If this occurs, check the points for references to addresses in the controller that are not configured within the controller.
If all the points built against a particular controller are bad and this controller fails, the configuration of this controller might be incorrect. Check that the controller name is defined in both the `GEF_CGF.INI` file and the `HOSTS` file.

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GEC GEM80 Interface Reference

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Getting started

1

This reference provides the information you need to set up, configure, and test GEM80 controllers.

Steps for connecting and configuring a GEM80.

Complete each step before commencing the next step.

Step:	Go to:
Set up controller in accordance with supplied documentation	
Set communications parameters	page 11
Define channels using Quick Builder	page 14
Define controllers using Quick Builder	page 17
Download channel and controller definitions to the server	
Define controller points using Quick Builder	page 19

Support and documentation for GEM80

Device support

The server supports GEC GEM80 Controllers via RS-422 or RS-232 serial links.

Other documentation on GEM80

The following GEC documents contain more information.

- *GEM80 Serial Communications Manual* (GEC document T457, issue 3, Feb 91)
- *GEM80/310 Series Technical Manual* (GEC document T1438, issue 2, June 91)
- *GEM80/400 Series Technical Manual* (GEC document T1614, issue 1)

GEM80 setup

2

This chapter describes how to set up a GEM80 controller.

The tasks for setting up a GEM80 controller are:

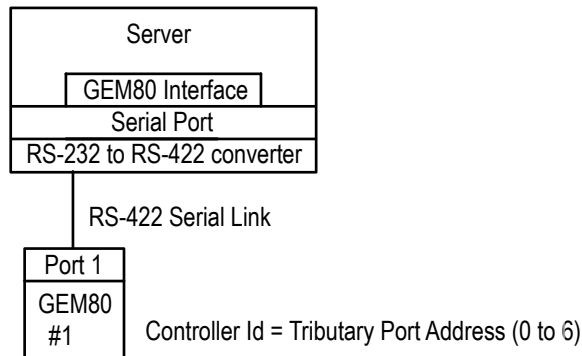
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Supported architecture	page 8
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Architectures for GEM80

GEM80 controllers connect to the server via an RS-422 or RS-232 serial link using the standard GEM80 Extended Simple Protocol (ESP). The server supports up to seven GEM80 controllers per channel.

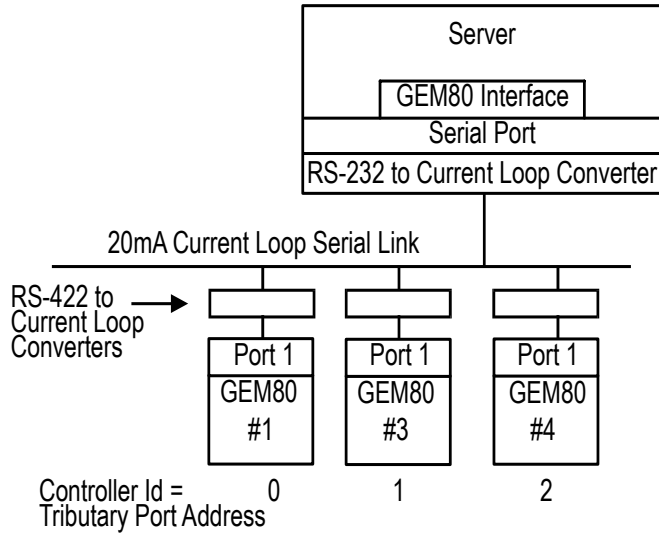
The following figures show typical architectures.

Point-to-point architecture



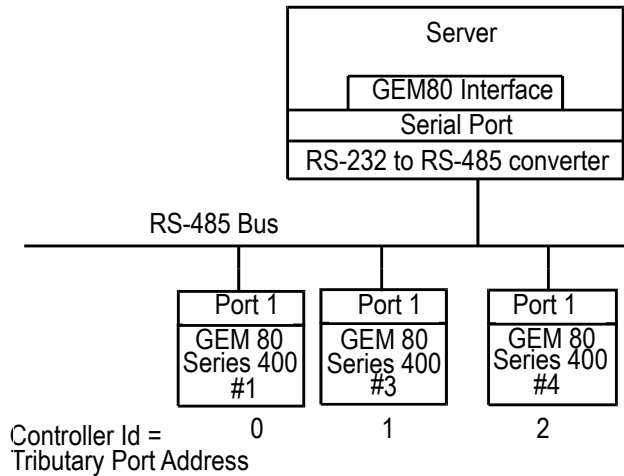
Multi-drop architecture for 310 series controllers

In a multi-drop configuration, the 310 Series controllers use current loop cabling.



Multi-drop architecture for 400 series controllers

In a multi-drop configuration, 400 Series controllers use RS-485 cabling, not current loop.



Protocol

The ESP Protocol is described in the *GEM80 Serial Communications Manual*.

Cabling

The cabling requirements vary according to architecture and controller model.

310 series controllers

Point-to-point operation

- 1 Connect an RS-422 ribbon cable from Port 1 of the GEM80 controller to an RS-422-to-RS-232 converter.
- 2 Connect the converter to an RS-232 port in the server.

Multi-drop operation

- 1 Connect an RS-422 ribbon cable from Port 1 of the GEM80 controller to an RS-422-to-20mA current loop converter.
- 2 Connect the converter to a 20mA current loop-to-RS-232 converter.
- 3 Connect the RS-232 converter to an RS-232 port in the server.
- 4 Connect the other controllers onto the 20mA current loop highway.

400 series controllers

Point-to-point operation

- 1 Connect an RS-232 serial cable from Port 1 of the GEM80 controller to an RS-232 Port in the server.
- 2 Swap TX and RX.
- 3 Feed 0V straight through.

Multi-drop operation

- 1 Connect all the controllers together via an RS-485 cable connected to Port 1 of each controller.
- 2 Connect the RS-485 cable to an RS-485-to-RS-232 converter.
- 3 Connect the RS-232 converter to the RS-232 Port of the server.

Setting up a GEM80 controller

Communication settings

Setup the controller's P table as follows:

310 Series	400 Series	
P(3)	P(10)	The baud rate (for example, 19200)
P(4)	P(11)	Set to 1 to indicate it is a tributary port
P(5)	P(12)	Set to 0 to be a free running port
P(6)	P(13)	The tributary address, which must be unique on a link and is between 0 and 6 (Equivalent to the controller's ID .)
P(7)	P(14)	The block size, which you set to 32.



Note

400 Series controllers can have a tributary address up to 14, and a block size up to 128. However, to be consistent with earlier models, you can only use the specified ranges.

GEM80 ladder logic requirements

All read and write requests are initiated by the server which acts as the only control port on the current loop highway. Therefore you must set up all controllers as tributary ports.

The server communicates by writing 32 words into the controller's J table. The ladder in the controller interprets the data and takes the appropriate action, including writing any necessary response into the K table. The server then reads 32 words from the K table and processes the response.

The first two words in the message are reserved for header information, as follows:

$$\begin{aligned}
 J0 &= \textit{ControlFlag} \times 100 + \textit{SequenceNumber} \\
 J1 &= 0 \times 2000 \text{ (indicating 32 words required)} + \textit{BlockNumber} \\
 K0 &= \textit{Error} * 0 \times 200 + J0 \\
 K1 &= J1
 \end{aligned}$$

Where:

- *ControlFlag* is 0 for reads and 1 for writes.

- *SequenceNumber* is a number from 0 to 255 which is incremented by the Server after each request to the controller. The ladder should reply with an error if this doesn't occur.
- *BlockNumber* is from 0 to 31.
- *Error* returned by the controller:
 - 0 = No error
 - 1 = Invalid sequence number during GEM80 I/O
 - 2 = GEM80 Reports controller error
 - 3 = GEM80 Reports block number invalid

Data reads

Server

The server writes to J0 & J1 as described above, with the control flag reset. J2 to J31 are ignored. The server reads the 32 elements of the K table immediately and throws away the results. The server makes the read request for a second time, this time the K table contains the response from the ladder and it is processed.

PLC ladder

The ladder gathers data of the specified size (30 words) from the specified block (block number) and writes it to the K table from locations K2 to K31. Any errors are written into K0 as specified above. The second “dummy” request is ignored.

Data writes

Server

The Server performs a data read as described above to get a copy of the block into its memory.

It then modifies just the element of the block being controlled and writes it out to the J table from J2 to J31. Elements J0 and J1 are as specified above, except that the control flag is set. The server reads the 32 elements of the K table immediately but ignores them, including errors.

PLC ladder

The ladder perform the data read as described above.

When the control request is sent (control flag is set), the ladder reads the contents of the J table (J2 to J31) and writes it to the specified block number in the controller.

GEM80 configuration and addressing


3

This chapter describes how to configure a GEM80 using Quick Builder.

For information about:	Go to:
Defining a GEM80 channel	page 14
Defining a GEM80 controller	page 17
Defining an address for a point parameter value	page 19
Optimizing scanning performance	page 21

Defining a GEM80 channel

To define a channel:

- 1 Click  to display the Add Items dialog.
- 2 Select channel as the item and GEM80 as the type.
- 3 Set the property values on the Main tab—see “GEM80 channel Main properties” on page 14.
- 4 Click the Port tab and for **Port Type** select either:
 - Serial
 - TerminalServer
 See “GEM80 channel Port properties” on page 15.

GEM80 channel Main properties

The Main tab defines the basic properties for a GEM80 channel.

Property	Description
Name	The unique name of the channel. A maximum of 10 alphanumeric characters (no spaces, underscores or double quotes).
Description (optional)	A description of the channel. A maximum of 30 alphanumeric characters, including spaces.
Marginal Alarm Limit	<p>The communications alarm limit at which the channel is declared to be marginal. When this limit is reached, a high priority alarm is generated. This limit is the channel barometer, which monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer is incremented by 2 or more, depending on the error and decremented for each good call.</p> <p>To calculate an acceptable limit, multiply the square root of the number of controllers on the channel with the controllers’ Marginal Alarm Limit (generally, you specify the same value for all controllers on a particular channel). For example, if there are 9 controllers, and you have set the controllers’ Marginal Alarm Limit to 10, the value would be $\pm 9 \times 10$ (that is, 30).</p>

Property	Description
Fail Alarm Limit	The communications alarm limit at which the channel is declared to have failed. When this barometer limit is reached, an urgent alarm is generated. Set this to double the value specified in Marginal Alarm Limit .
Connect Timeout	The time, in seconds, the server attempts to connect to a controller before giving up. The default value is 10 seconds.
Read Timeout	The time, in seconds, the server attempts to read data from a controller before giving up. The default value is 2 seconds.
Item Type	Shows the type of item specified when this item was created.
Last Modified	Shows the date of the most recent modification to this channel's property details.
Item Number	The unique item number currently assigned to this item. You can change the item number if you need to match your current server database configuration. The number must be between 1 and the maximum number of channels allowed for your system.

GEM80 channel Port properties

The Port tab defines the communication-related properties for a channel. The properties vary according to the selected **Port Type**:

- **serial**. Select this if you are using a Stallion EasyConnection adapter. See “Serial port properties” on page 15.
- **terminalserver**. Select this if you want to connect the GEM80 to the server via a LAN. See “Terminal server port properties” on page 16.
- **LANvendor**. Not applicable to GEM80 controllers.

Serial port properties

Property	Description
Serial Port Name	The device name of the serial port.
Baud Rate	The number of data bits per second. The default is 9600.
Number of Data Bits	Set this to 7.
Stop Bits	Set this to 1.


Property	Description
Parity	Set this to ODD.
Checksum	Set this to None.
XON/XOFF	Set this to None.
RS-232	<p>Only applicable for a an RS-232 link. (The RS-232 and RS-485 settings are mutually exclusive.)</p> <p>Enable RTS/CTS flow control. Select this if you want to use RTS/CTS for flow control to stop a receiver from being overrun with messages from a sender.</p> <p>Detect DCD. Select this if the Data Carrier Detect communication status line of the COM port requires monitoring (usually when using modem or microwave linking). When selected, the communications fails if the desired COM status line is not high—for example, on a dial-up link connection for a modem.</p> <p>Detect DSR. Select this if the Data Set Ready communication status line of the COM port requires monitoring (usually when using modem or microwave linking). When selected, the communications fails if the desired COM status is not achieved.</p>
RS-485	<p>Only applicable for a an RS-485 link. (The RS-485 and RS-232 settings are mutually exclusive.)Select Enable Stallion RS-485 Half Duplex and Echo. (Echo indicates that the server expects messages it sends to the port on the transmit line to be echoed back on the receive line.)</p>

Terminal server port properties

Property	Description
Terminal Server TCP Host Name	The name and port number of terminal server to which the channel is connected.
Terminal Server TCP Port No	You can specify either a TCP host name or an IP address, but it must match the TCP host name used when you installed and internally configured the terminal server.
Idle Timeout	<p>The time, in seconds, the channel waits for a successful connection to the server before closing the connection.</p> <p>A value of 0 indicates that the connection is never closed.</p>
Checksum	Set this to None.

Defining an GEM80 controller

To define a controller:

- 1 Click  to display the Add Items dialog.
- 2 Select Controller as the item and GEM80 as the type.
- 3 Set the property values on the Main tab. See “GEM80 controller Main properties” on page 17.

GEM80 controller Main properties

The Main tab defines the basic properties for a GEM80 controller.

Property	Description
Name	The unique name of the controller. A maximum of 10 alphanumeric characters (no spaces, underscores or double quotes).
Description (optional)	A description of the controller. A maximum of 30 alphanumeric characters, including spaces.
Channel Name	The GEM80 channel on which the controller communicates with the server.
Marginal Alarm Limit	The communications alarm marginal limit at which the controller is declared to be marginal. When this limit is reached, a high priority alarm is generated. This limit is the controller barometer, which monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer is incremented by 2 or more, depending on the error and decremented for each good call. The default value is 25.
Fail Alarm Limit	The communications alarm fail limit at which the controller is declared to have failed. When this barometer limit is reached, an urgent alarm is generated. Set this to double the value specified in Marginal Alarm Limit .
Controller ID	ID of the controller, which is between 0 and 6 and is unique on the channel. This must be the same as the controller’s tributary address—see “Setting up a GEM80 controller” on page 11.
Item Type	Shows the type of item specified when this item was created.

Property	Description
Last Modified	Shows the date of the most recent modification to this controller's property details.
Item Number	The unique item number currently assigned to this item. You can change the item number if you need to match your current server database configuration. The number must be between 1 and the maximum number of channels allowed for your system.


Defining a GEM80 address for a point parameter

Entering an address

For **PV Source Address**, **Source Address**, and **Destination Address** the format for an GEM80 controller address is:

ControllerName Location

Part	Description
<i>ControllerName</i>	The name of the GEM80 controller.
<i>Location</i>	The address within the controller where the value is stored. See “Location syntax” on page 19.

If you would like help when defining an address, click  next to **Address** to display Address Builder. For details, see the help.

Location syntax

The format for the location is:

BB WW bb DataFormat

Part	Description
<i>BB</i>	The block number, between 0 and 31.
<i>WW</i>	The word number, between 2 and 31.
<i>bb</i>	The bit number, between 0 and 15.
<i>DataFormat</i>	The data format, which can only be used for analog point parameters. See “Data formats” on page 20.

Data formats

The data format is only valid for analog point parameters. The formats are shown in the following table.

Data Format	Description	Counts	Scaled
S16B	16-bit, signed	-32767 to 32768	yes
U16B	16-bit, unsigned	0 to 65535	yes
U1023	10-bit, unsigned	0 to 1023	yes
U4095	12-bit, unsigned	0 to 4095	yes

“S” and “U” range format types are scaled by the 0% and 100% of the HOST range values.

Optimizing scanning performance

Two types of scan packets are built for GEM80 controllers:

- **Hardware diagnostic scan.** One scan per controller every 60 seconds is initiated automatically by the server to verify communications integrity with the controller. One hardware diagnostic scan is automatically created per scan packet.
- **Periodic data acquisition scan.** On demand, the server acquires a value from a controller and processes the value as a point parameter.

For each source address scanned, a scan period can be specified. The period specified depends on the nature of the parameter. A fast changing or critical parameter uses a fast rate; an infrequent or non-critical (for example, SP) parameter should use a slower rate.

Tips:

- All external I/O board values can be written to data area registers and thus reduce the number of scan packets.
- External remote I/O board values can also be written to data area registers reducing the number of controllers.
- Closely blocking the scanned registers will minimize the scanning of registers not being used by the system.
- Ensure that all points within a scanning block have the same scanning period.

Server tasks for GEM80

4

There is no test utility for GEM80 controllers.

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Hitachi Interface Reference

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Getting started

1

This reference provides the information you need to set up, configure, and test the interface to Hitachi controllers.

Steps for connecting and configuring a Hitachi.

Complete each step before commencing the next step.

Step:	Go to:
Configure communications to Hitachi controller	page 15
Define channels using Quick Builder	page 18
Define controllers using Quick Builder	page 22
Download channel and controller definitions to the server	
Test communications	page 32
Define controller points using Quick Builder	page 24

Support and documentation for Hitachi

Device support

The server supports the range of Hitachi controllers that conform to the H-Series protocol:

- H252 (addresses up to 1Kbytes)
- H300 (addresses up to 8Kbytes)
- H700 (addresses up to 16Kbytes)
- H2000 (addresses up to 48Kbytes)

Other documentation on Hitachi

The *Hitachi Programmable Controller* manual for the H-Series PLCs.

Hitachi setup

2

This chapter describes how to set up a Hitachi controller interface.

For:	Go to:
Supported architectures	page 8
Controller address support	page 14
Configuring communication settings	page 15

Architectures for Hitachi

The server communicates with Hitachi H-Series controllers via:

- An RS-232 link to the CPU
- An RS-232 or RS-422 link to a COM-2H module



Note

If you use an RS-422 link, the server requires a Stallion EasyConnect serial adapter.

The server treats each link as a channel, and each physical controller has three addressable logical controller types. The three logical controller types, segment the internal registers in the controller as follows:

Controller Type	Register Area(s)
0	External IO Link Area Data Area Internal Bit Output Timer Counters (TM,CL and TC) Edge Detection Master Control
1	Internal Word Output (Max 8K)
2	Remote External IO

A Type 1 Controller scans up to 8K of contiguous registers. Multiple Type 1 controllers are required to read more than 8K of contiguous registers.

The server supports the following Hitachi H-Series system architectures:

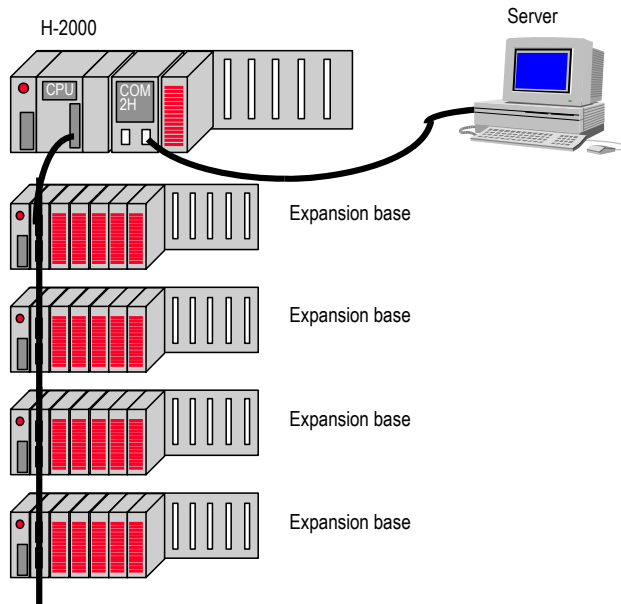
- Separate System
- Remote I/O System
- CPU Link System
- Host Link System
- Complex System

Separate System

A Separate System consists of only the base unit, or a combination of base and expansion units connected by extension cables.

The I/O on the expansion boards is known as *external I/O*. Controller Type 0 incorporates all external I/O off the base rack.

Figure 1 Separate System architecture



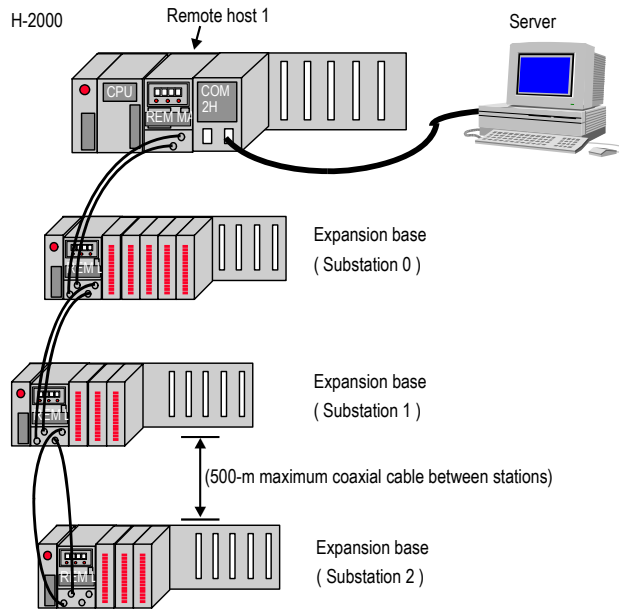
Remote I/O System

A Remote I/O System consists of the H-Series controllers with remote I/O expansion units connected via remote I/O modules.

The server treats each remote host station module (REM-MAH) as a separate Type 2 controller. You can mount a maximum of 4 REM-MAH modules onto a base rack of 9 slots. If communication to the server is via a COM-2H module, only 7 slots would be left, therefore only 3 remote host modules would be available.

You can multi-drop a maximum of 10 remote sub-station modules (REM-LOH) off a single remote host module.

Figure 2 Remote I/O System architecture

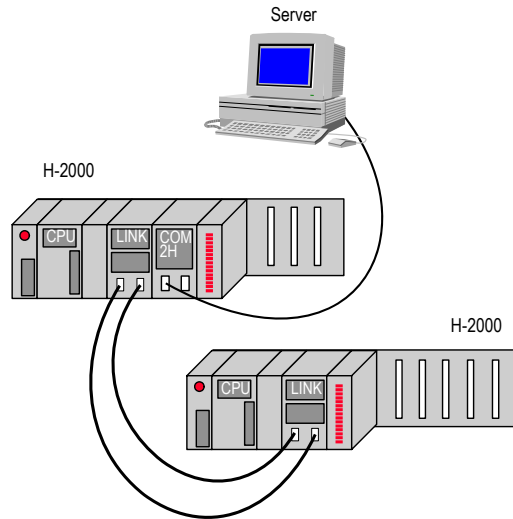


CPU Link System

A CPU Link System consists of one or more H-Series controllers connected via the CPU link module.

The server treats each networked H-Series controller as a separate controller. The network address (LUMP) is configurable when defining a controller.

Figure 3 CPU Link System architecture

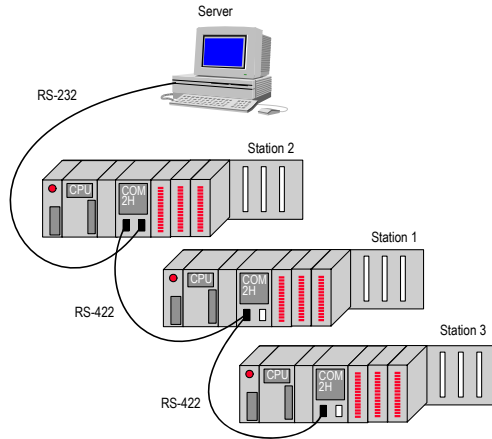


Host Link System

In a Host Link system the server is connected to the H-Series controller via the RS-232 or RS-422 port of the COM-2H module. An RS-422 cable provides a connection to other controllers. Each controller is addressed by the station number set switch, which ranges from 0 to 31.

The server treats each multi-dropped controller as a separate controller. The station number of the controller (also called “office number”) is configured when defining the controller.

Figure 4 Host Link System architecture

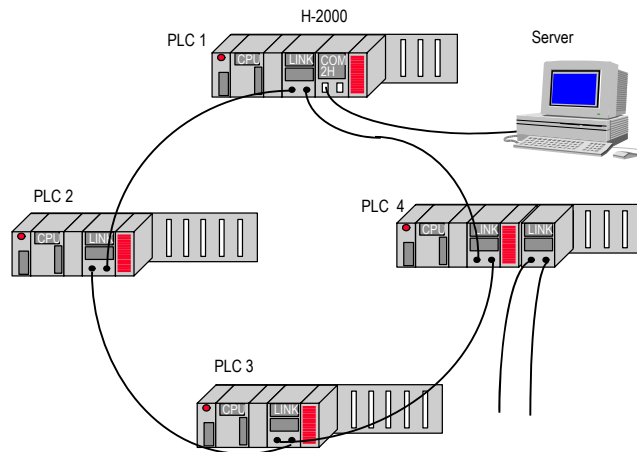


Complex System

A Complex System consists of a CPU Link System and one or more Remote I/O Systems.

Hitachi networking

You can network Hitachi controllers using network modules (called *link modules*). You can have up to 64 link modules in a system—a system is defined as all the devices contained within a loop. There is a maximum of 2 link modules per CPU. A host connected to a CPU with two link modules attached, has access to the data on all Hitachi controllers attached to the 2 network loops.

Figure 5 Networking system architecture

There are two methods of accessing data on different controllers:

- Link area
- Network addressing of the message packet

Link area

The link area in the CPUs memory is common to all attached controllers. Data required by another controller on the loop is copied to a specific address within the link area. CPUs can have 2 link areas. Link area 1 refers to link module 1 and link area 2 refers to link module 2.

Network addressing

Data is read from memory areas of connected controllers by assigning a network address to the message packet. You assign a network address to each link module. The network address is made up of the following:

- Loop no
- Unit No, which must be unique on a loop
- Module No
- Port No

In the figure, the server can read data from PLCs 1 to 4, but it cannot directly access the controllers attached to the second link module on PLC 4 because of H-

Series protocol limitations. However, the server can access to the controllers on this network system using the second link area of PLC 4.

Hitachi controller address support

The following table shows the addressable areas for H-Series controllers. The **Supported** column indicates which areas the server can address.

Memory area	Addressable range	Size	Supported ⁱ
External I/O	See “External I/O” on page 26.		Y
Remote external I/O	See “Remote external I/O” on page 27.		Y
CPU Link Area 1	0 - 3FF (hex)	1024 words	Y
CPU Link Area 2	1000 - 13FF (hex)	1024 words	Y
Internal Bit Area	0 - 7BF (hex)	1984 points	Y
Internal Special Bit	7C0 - 7FF (hex)	64 points	Y
Internal Word Area	0 - Ram module size ⁱⁱ (hex)	1K words	Y
		8K Words	Y
		16K Words	Y
		48K Words	Y
Internal Special Word	F000 - F1FF (hex)	512 Words	Y
Data Area	0 - 3FF (hex)	1024 Words	Y
Edge Detection	0 - 511 (dec)	512 points	N
Master Control	0 - 49 (dec)	50 points	N
Counter Clear	0 - 511 (dec)	512 points	Y
Timer Reset	0 - 255 (dec)	256 points	Y
Timer/Counter Value	0 - 511 (dec)	512 Words	Y

i Y = supported, N = Not supported

ii Sizing of this memory area is dependent on installed RAM card and model:

- The H252 can address up to 1Kbytes
- The H300 can address up to 8Kbytes
- The H700 can address up to 16Kbytes
- The H2000 can address up to 48Kbytes

Note that:

1 point = 1 bit of data

1 word = 16 bits of data

Configuring communication settings

There are two methods of connecting Hitachi controllers:

- CPU module
- COM-2H module

CPU module

RS-232 must be used for connection to the CPU module. See the CPU Module manual for detailed communication parameters.

The standard setting of a Hitachi controller communications port is:

Baud Rate	19200
Parity	Even
Data Bits	7
Stop Bits	1

COM-2H module

RS-232 or RS-422 can be used for connection to the COM-2H module and can also be supported simultaneously. See the following table for specification details.

Table 1 COM-2H specifications

Item	Specification
Interface	RS-232, RS-422
Baud Rate	300, 600, 1200, 2400, 4800, 9600, 19200
Communication	Half-duplex
Activation	One-way Asynchronous
Transmission	Serial
Transmission code	ASCII
Error Control	vertical parity, overrun, framing, sum
Maximum message length	503 bytes/message

Detailed pinout diagrams for RS-232 and RS-422 cabling, can be found in the H-Series COM-2H manual.

The following table details the operation mode set switch settings for RS-232 and RS-422 connections. The switch determines if the station number is sent to the controller in the header of packets by the host.

Table 2 Operation mode set switch

Switch	RS-232	RS-422
0	One-way activation (with station number)	
1	One-way activation (without station number)	Both-way activation (with station number)
2	One-way activation (without station number)	One-way activation (with station number)
3	Both-way activation (without station number)	Both-way activation (without station number)
4	Both-way activation (without station number)	One-way activation (with station number)

Only one-way communication with the controller is supported by the Hitachi interface. Non-station mode is not provided when communicating one-way using RS-422.

Set the operation mode set switch to 2 on the COM-2H module, to support one-way communication with the RS-232 and RS-422. Only the host connected to the RS-422, will be able to communicate with the controllers in a host link configuration in this mode. See “Host Link System architecture” on page 12.

When the operation mode set switch is set to 0, a host connected via RS-232 will be able to communicate with controllers in a host link configuration, and the RS-422 port will be disabled.

Hitachi configuration and addressing


3

This chapter describes how to configure a Hitachi using Quick Builder.

For:	Go to:
Defining a Hitachi channel	page 18
Defining a Hitachi controller	page 22
Defining an address for a point parameter value	page 24
Optimizing scanning performance	page 30

Defining a Hitachi channel

To define a channel:

- 1 Click  to display the Add Items dialog.
- 2 Select channel as the item and Hitachi as the type.
- 3 Set the property values on the Main tab—see “Hitachi channel Main properties” on page 18.
- 4 Click the Port tab and for **Port Type** select either:
 - Serial
 - TerminalServer
 See “Hitachi channel Port properties” on page 19.

Hitachi channel Main properties

The Main tab defines the basic properties for a Hitachi channel.

Property	Description
Name	The unique name of the channel. A maximum of 10 alphanumeric characters (no spaces, underscores or double quotes).
Description	(Optional) A description of the channel. A maximum of 30 alphanumeric characters, including spaces.
Marginal Alarm Limit	<p>The communications alarm limit at which the channel is declared to be marginal. When this limit is reached, a high priority alarm is generated. This limit is the channel barometer, which monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer is incremented by 2 or more, depending on the error and decremented for each good call.</p> <p>To calculate an acceptable limit, multiply the square root of the number of controllers on the channel with the controllers’ Marginal Alarm Limit (generally, you specify the same value for all controllers on a particular channel). For example, if there are 9 controllers, and you have set the controllers’ Marginal Alarm Limit to 10, the value would be $\pm 9 \times 10$ (that is, 30).</p>

Property	Description
Fail Alarm Limit	The communications alarm limit at which the channel is declared to have failed. When this barometer limit is reached, an urgent alarm is generated. Set this to double the value specified in Marginal Alarm Limit .
Station Numbers	Select Used if the server uses station numbers to access controllers (for example, when networking controllers).
Write Delay	The number of milliseconds that the server waits before writing to the controller. If there is a communications problem and the controller is not responding to writes from the server, try changing this setting to 11 milliseconds or more. This should allow the controller enough time to become ready to receive data from the server.
Connect Timeout	The time, in seconds, the server attempts to connect to a controller before giving up. The default value is 10 seconds.
Read Timeout	The time, in seconds, the server attempts to read data from a controller before giving up. The default value is 2 seconds.
Item Type	Shows the type of item specified when this item was created.
Last Modified	Shows the date of the most recent modification to this channel's property details.
Item Number	The unique item number currently assigned to this item. You can change the item number if you need to match your current server database configuration. The number must be between 1 and the maximum number of channels allowed for your system.

Hitachi channel Port properties

The Port tab defines the communication-related properties for a channel. The properties vary according to the selected **Port Type**:

- **serial**. Select this if you are using a Stallion EasyConnection adapter. See “Serial port properties” on page 20.
- **terminalserver**. Select this if you want to connect the controller to the server via a LAN. See “Terminal server port properties” on page 21.
- **LANvendor**. Not applicable to Hitachi controllers.

**Note**

Set the port properties to the same values as those specified when configuring the controller.

Serial port properties


Property	Description
Serial Port Name	The device name of the serial port.
Baud Rate	The number of data bits per second.
Number of Data Bits	The number of data bits used for transmission.
Stop Bits	The number of stop bits used for transmission.
Parity	The parity verification used on the port.
Checksum	The type of checksum error detection used for the port.
XON/XOFF	The type of XON/XOFF software flow control used to stop a receiver from being overrun with messages from a sender. the types are: <ul style="list-style-type: none"> • None (default) • Input (use XON/XOFF to control the flow of data on the receive line) • Output (use XON/XOFF to control the flow of data on the transmit line)
RS-232	Not applicable. (The RS-232 and RS-485 settings are mutually exclusive.)
RS-485	Select Enable Stallion RS-485 Half Duplex and Echo . (Echo indicates that the server expects messages it sends to the port on the transmit line to be echoed back on the receive line.)

Terminal server port properties

Property	Description
Terminal Server TCP Host Name Terminal Server TCP Port No	The name and port number of terminal server to which the channel is connected. You can specify either a TCP host name or an IP address, but it must match the TCP host name used when you installed and internally configured the terminal server.
Idle Timeout	The time, in seconds, the channel waits for a successful connection to the server before closing the connection. A value of 0 indicates that the connection is never closed.
Checksum	<ul style="list-style-type: none"> • Set this to None.

Defining an Hitachi controller

To define a controller:

- 1 Click  to display the Add Items dialog.
- 2 Select controller as the item and Hitachi as the type.
- 3 Set the property values on the Main tab. See “Hitachi controller Main properties” on page 22.

Hitachi controller Main properties

The Main tab defines the basic properties for a Hitachi controller.

Property	Description
Name	The unique name of the controller. A maximum of 10 alphanumeric characters (no spaces, underscores or double quotes).
Description	(Optional) A description of the controller. A maximum of 30 alphanumeric characters, including spaces.
Channel Name	The Hitachi channel on which the controller communicates with the server.
Marginal Alarm Limit	The communications alarm marginal limit at which the controller is declared to be marginal. When this limit is reached, a high priority alarm is generated. This limit is the controller barometer, which monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer is incremented by 2 or more, depending on the error and decremented for each good call. The default value is 25.
Fail Alarm Limit	The communications alarm fail limit at which the controller is declared to have failed. When this barometer limit is reached, an urgent alarm is generated. Set this to double the value specified in Marginal Alarm Limit .
Controller Type	Specifies the Hitachi controller type. For: <ul style="list-style-type: none"> • Type 0, select All PLC register areas except areas covered by types 1 and 2 • Type 1, select Internal word output • Type 2, select Remote External I/O

Property	Description
Controller ID	<p>The ID of the controller. The format of the ID is: ID . LoopNumber . UnitNumber . 0 . 0</p> <p>Where:</p> <p>ID = Only applicable for a multi-dropped controller (if Station Numbers in the channel is set to Used). A unique number between 0 and 31.</p> <p>LoopNumber = Number of CPU link, which is either 1 or 2.</p> <p>UnitNumber = Unit number in CPU link (Also known as station number). A unique number between 1 and 63.</p>
Offset	<p>The address offset into WR register area default is 0.</p> <p>Each controller has an 8K address limitation. For example: to address WR20170, the controller offset of 20000 could be used, with the point built at WR170.</p>
Item Type	<p>Shows the type of item specified when this item was created.</p>
Last Modified	<p>Shows the date of the most recent modification to this controller's property details.</p>
Item Number	<p>The unique item number currently assigned to this item. You can change the item number if you need to match your current server database configuration. The number must be between 1 and the maximum number of channels allowed for your system.</p>


Defining an Hitachi address for a point parameter

Entering an address

For **PV Source Address**, **Source Address**, and **Destination Address** the format for an Hitachi controller address is:

ControllerName Location

Part	Description
<i>ControllerName</i>	The name of the Hitachi controller.
<i>Location</i>	The address within the controller where the value is stored. See “Location syntax” on page 24.

If you would like help when defining an address, click  next to **Address** to display Address Builder. For details, see the help.

Location syntax

The format for the location is:

Address [DataFormat|BitNumber]

Part	Description
<i>Address</i>	The address within the controller register tables. See “Hitachi register address format” on page 24.
<i>DataFormat</i>	Only applicable to analog and accumulator values. See “Data formats” on page 29.
<i>BitNumber</i>	If the controller table code is a word code, you must specify the bit number.

Hitachi register address format

The address format varies according to register type:

- Internal bit area
- Internal word area
- Data area
- Timer counter area
- External I/O

- Remote external I/O
- CPU link area

Internal bit area

Numbers are hexadecimal.

Name	Point address	Examples
Internal bit area	R 0 to 7BF	R 01F
Internal special bit area	R 7C0 to 7FF	R 7DF

Internal word area

Numbers are hexadecimal.

Name	Point address	Examples
Internal word area	WR 0 to 3FF WR 0 to 43FF WR 0 to C3FF	W R01F WR 41FF WR C3DF
Internal double-word area	DR 0 to 3FE DR 0 to 43FE DR 0 to C3FE	DR 3E1 DR 03FE DR 23FE
Internal special word area	WR F000 to F1FF	WR F11F
Internal special double-word area	DR F000 to F1FE	DR F11A

Data area

Numbers are hexadecimal.

Name	Point address	Examples
Bit data area	M 0 to 3FFF	M 301F
Word data area	WM 0 to 3FF	WM 20F
Double-word data area	DM 0 to 3FE	DM 010

Timer counter area

Numbers are in decimal notation.

Name	Point address	Examples
On-delay timer	TD 0 to 255	TD 25
Re-triggerable timer	SS 0 to 255	SS 2
Watchdog timer	WDT 0 to 255	WDT 23
Monostable timer	MS 0 to 255	MS 255
Accumulation timer	TMR 0 to 255	TMR 45
Up counter	CU 0 to 511	CU 1
Ring counter	RCU 0 to 511	RCU 311
Up/Down counter's up input	CTU 0 to 511	CTU 511
Up/Down counter's down input	CTD 0 to 511	CTD 17
Up/Down counter's output	CT 0 to 511	CT 411
Elapsed counter clear	CL 0 to 511	CL 509
Timer counter elapsed time	TC 0 to 511	TC 261

Where:

TC = 512 words

CL = 512 points

The remaining values are uniquely numbered and form the same address space.

**Note**

Timer area points are back-built to a TM code, except tables CL and TC.

External I/O

Name	Point address
External bit input	<i>X u s b</i>
External bit output	<i>Y u s b</i>
External word input	<i>WX u s m</i>
External word output	<i>WY u s m</i>
External double word input	<i>DX u s m</i>
External double word output	<i>DY u s m</i>

Where:

u = Unit No. (0 - 5)

s = Slot No. (0 - A hexadecimal notation)

b = Bit No. (00 - 95 decimal notation)

m = Word No. (0 - 9)

The following table lists the maximum number of I/O points allowed by each controller model.

Type	H2000	H700	H300	H100m
32 point I/O	2,048	640	288	160
64 point I/O	4,096	1,280	576	160
64 point I/O& remote I/O	5,632	2,816	2,112	2,112

Maximum No. of expansion units = 5

Maximum no of mounted I/O modules = 64 (The maximum size for an expansion rack is 11 slots. The base rack is a 9-slot rack. Maximum number of I/O modules is therefore $11*5+9 = 64$.)

Example

Bit input Unit 0, Slot 4, Bit 6:

X 0 4 6

Bit output Unit 2, Slot 10, Bit 12:

Y 2 A 12

Word input Unit 5, Slot 0, Word 8:

WX 0 5 8

Word output Unit 0, Slot 2, Word 1:

WY 0 2 1

Double word input Unit 4, Slot 10, Word 0:

DX 4 A 0

Double word output Unit 2, Slot 10, Word 6:

DY 2 A 6

Remote external I/O

Name	Point address
Remote External bit input	X r st s b

Name	Point address
Remote External bit output	$Y r St s b$
Remote External word input	$WX r St s m$
Remote External word output	$WY r St s m$
Remote External double word input	$DX r St s m$
Remote External double word output	$DY r St s m$

Where:

r = Remote host station no. (1 - 4)

st = Remote substation No (0 - 9)

s = Slot No. (0 - A Hexadecimal notation)

b = Bit No. (00 - 95 Decimal notation)

m = Word No. (0 - 9)

Max No. of remote host stations	4
Max No. of remote substations/ host station	10
Max No of points / host station	512
Max No of Points	2048

Example

Bit input remote host 1, substation 3, Slot 9, Bit 6:

$X 1 3 9 6$

Bit output remote host 4, substation 4, Slot 10, Bit 12:

$Y 4 4 A 12$

Word input remote host 1, substation 2, Slot 9, Word 8:

$wX 1 2 9 8$

Word output remote host 1, substation 2, Slot 0, Word 1:

$wY 1 2 0 1$

Double word input remote host 1, substation 1, Slot 10, Word 0:

$DX 1 1 A 0$

Double word output remote host 3, substation 2, Slot 10, Word 7:

$DY 3 2 A 7$

CPU link area

Numbers are hexadecimal.

Name	Point address	Examples
Bit CPU link area 1	L 0 to 3FFF	L 001FF
Word CPU link area 1	WL 0 to 3FF	WL 02F3
Double-word CPU link area 1	DL 0 to 3FE	DL 000A
Bit CPU link area 2	L 10000 to 13FFF	L 101FF
Word CPU link area 2	WL 1000 to 13FF	WL 12F3
Double-word CPU link area 2	DL 1000 to 13FE	DL 100A

Data formats

The data format is only valid for analog and accumulator points. The standard formats are shown in the following table.

Data Format	Description	Counts	Scaled
S16B	16-bit, signed	-32767 - 32768	yes
U15B	15-bit, unsigned	0 - 32767	yes
U16B	16-bit, unsigned	0 - 65535	yes
U3BCD	12-bit, BCD	0 - 999	yes
U4095	12-bit, unsigned	0 - 4,095	yes
U4BCD	16-bit, BCD	0 - 9999	yes
U8BCD	32-bit, BCD	0 - 99999999	yes

“U” range format types are scaled by the 0% and 100% of the HOST range values.

Example HITWM10 02 WM 100 U4095

Optimizing scanning performance

Two types of scan packets are built for Hitachi controllers:

- **Hardware diagnostic scan.** One scan per controller every 60 seconds is initiated automatically by the server to verify communications integrity with the controller. One hardware diagnostic scan is automatically created per scan packet.
- **Periodic data acquisition scan.** Periodically, the server acquires a value from a controller and processes the value as a point parameter.

For each source address scanned, a scan period can be specified. The period specified depends on the nature of the parameter. A fast changing or critical parameter uses a fast rate; an infrequent or non-critical (for example, SP) parameter should use a slower rate.



Tip

- All external I/O board values can be written to data area registers and thus reduce the number of scan packets.
 - External remote I/O board values can also be written to data area registers reducing the number of controllers.
 - Closely blocking the scanned registers will minimize the scanning of registers not being used by the system.
 - Ensure that all points within a scanning block have the same scanning period.
-

Server tasks for Hitachi

4

This chapter describes tasks for Hitachi controllers that you perform on the server.

For:	Go to:
Testing communications with the server	page 32

Testing Hitachi communications

You use the test utility, **hittst**, to test communications between the Hitachi controller and the server.



Caution

It is advisable not to run the utility run while the Channel is enabled.

To run the test utility:

- 1 Open a Command Prompt window on the server.
- 2 Type **hittst** and press ENTER.

Entries are self-explanatory.

You can read/write data to all registers that can be addressed by the server. See “Hitachi controller address support” on page 14.

If you are using a COM-2H module, the transmit and receive LEDs flash during transactions.

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Honeywell DPR Interface Reference

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CONTENTS

Getting started

1

This reference provides the information you need to set up, configure, and test DPR controller communications with the server. There is detailed information for defining the controller using Quick Builder.

Complete each step before commencing the next.

Steps for connecting and configuring a DPR Controller.

Steps	Go to:
Connect the cables from the server to the DPR device as shown.	page 8
Set the communication parameters on the DPR device.	page 12
Use Quick Builder to define a DPR channel for the communications link.	page 14
Use Quick Builder to define a controller for each DPR device on the communication link.	page 19
Test the communications link between the server and the DPR device.	page 26
Use Quick Builder to define points.	page 21

Support and documentation for DPR

Devices supported by the DPR Interface

The server supports the following DPR models with the Modbus Communication Option installed:

- DPR 3000
- DPR 100
- DPR 180
- DPR 250

The server communicates with the devices via RS-232 or RS-485 connections using the Modbus protocol.

Other documentation for DPR

Before using or installing the interface, be sure you have on hand for reference:

- *DPR 3000 Communications Options Manual* (EN1I-6127)
- *DPR 100 Communications Options Manual* (US1I-6149)
- *DPR 180 / DPR 250 Communications Options Manual* (EN1I-6189)

DPR controller setup

2

This chapter describes how to set up an DPR controller for the system.

The tasks for setting up a DPR controller are:

For	Go to:
Connecting to the server	page 8
Communication settings	page 12

Connecting the DPR

DPR interface supports connection to the server via RS-232, RS-422 and RS-485 serial connection.

- If only one device is required to connect to the server, connect an RS-232 server port to the RS-232 DPR port. If your server has multiple serial ports, one additional DPR device can be connected per serial port.
- If multiple devices need to be connected to the server, RS-422 and RS-485 can be used with either an RS-232 to RS-422/RS-485 converter or a Stallion adapter.

Additional information can be found in the *Communications Options Manual* for your model DPR.

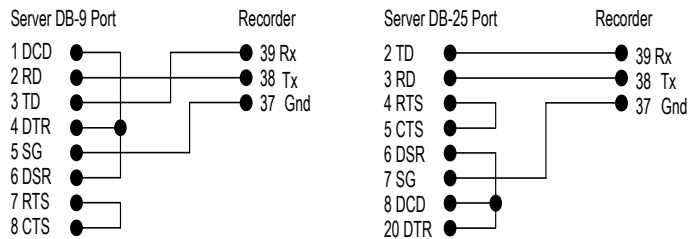
RS-232 cabling

RS-232 can be used to directly connect a single DPR device to a serial port on the server. If your server has multiple serial ports then one additional DPR device can be connected per serial port.

Connect the RS-232 port of the server to the RS-232 port of the DPR. Cabling diagrams for this connection are shown below.

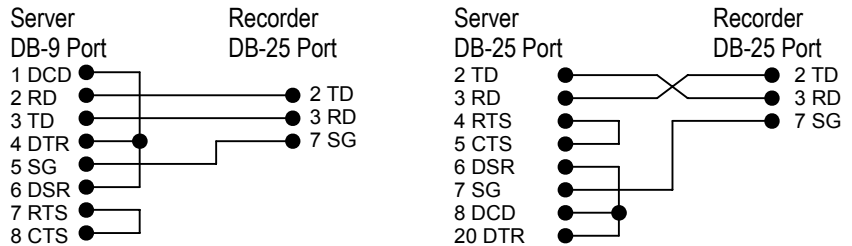
DPR300

Figure 1 DPR 3000 connections



DPR 100/180/250

Figure 2 DPR 100/180/250 Connections



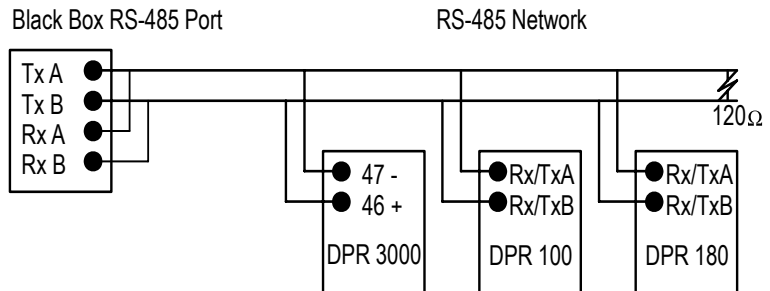
Using an RS-232/485 converter

Honeywell recommends that you use the Black Box LD485-HS RS-232/485 Interface Converter. This converter has been qualified by Honeywell. Use of another converter may produce unexpected results.

To connect:

- Connect the RS-232 port of the Black Box converter to an RS-232 port on the server using a straight through cable.
- Connect the DPR devices on the RS-485 network to the converter.

Figure 3 Black Box connections



Black Box settings

Switch	Setting	Description
XW1A	jumper in ⁱ	Configure RS-232 port as DCE
XW1B	jumper out	Do not configure RS-232 port as DTE

Switch	Setting	Description
W8	B-C	2-wire (half-duplex) operation
W9	C ⁱ	0 ms RTS/CTS delay
W15	B-C	RS-485 transmitter enabled by data
W5	A-B ⁱ	RTS/CTS normal
W17	C	2 ms transmitter enabled time. This is good for 9600 BAUD. Decrease for higher BAUD rates. Increase for lower BAUD rates.
		A - 30 ms
		B ⁱ - 7 ms
		C - 2 ms
		D - 0.7 ms
		E - 0.15 ms
W16	B ⁱ	0.1 ms delay before receiver enabled
Term	ON	RS-485 receiver terminated
Bias	OFF ⁱ	Line bias off

ⁱ Denotes non-default value

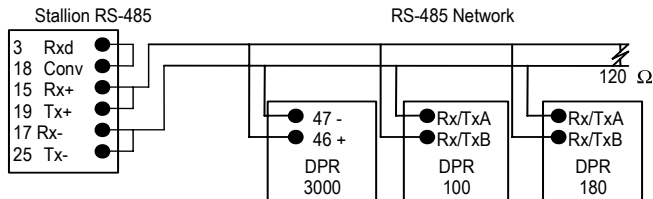
Using an RS-485 adapter

The Stallion EasyConnection adapter with the RS-232/RS-422/RS-485 8-port communications module has been qualified by Honeywell.

To connect:

- Install the adapter and driver in the server as described in the adapters documentation. For more information, see the Stallion-related instructions in the *Installation Guide*.
- Connect a port on the communications module (installed on the server) directly to the RS-485 network to which the DPRs are connected.

Figure 4 RS-485 Connections



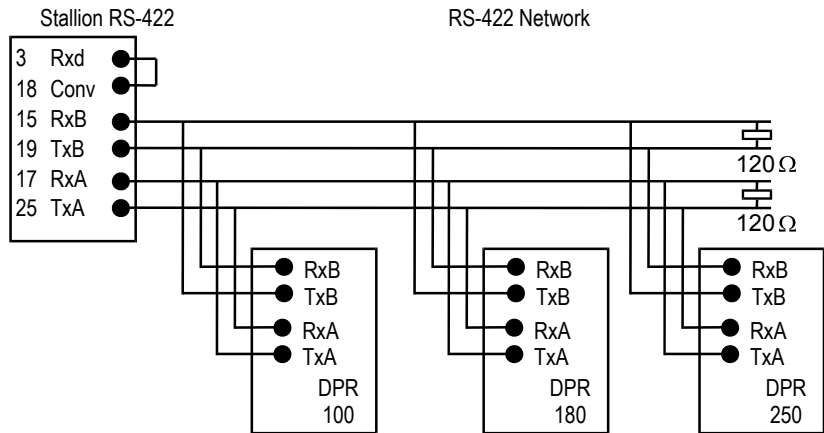
Using an RS-422 adapter

The Stallion EasyConnection adapter with the RS-232/RS-422/RS-485 8-port communications module has been qualified by Honeywell.

To connect:

- Install the adapter and driver in the server as described in the adapters documentation. For more information, see the Stallion-related instructions in the *Installation Guide*.
- Connect a port on the communications module (installed on the server) directly to the RS-422 network to which the DPRs are connected.

Figure 5 RS-422 Connections



Communication parameters

Configure the DPR for an appropriate address (ID), baud rate, data, parity, and stop bits. Consult the *Communication Options Manual* that came with your DPR device for information on how to do this.

Some recommended values would be:

Protocol	Controller setting
Connect	RS-232/RS-485/RS-422 ⁱ
Address	1 ⁱⁱ
BAUD	9600
Bits	8
Stop	1
Parity	None

- i Not applicable on the DPR 3000. Value depends on how you have cabled up the devices.
- ii If the DPR device is connected to a RS-422/RS-485 network then the address should be unique for each device on the network.

Check the switch positions on the Communication Option board of the DPR device to make sure they are correct for either RS-232 or RS-485.

DPR3000			
RS-232		RS-485	
SW1	N/A	SW1	0
SW2	N/A	SW2	0
SW3	RS-232	SW3	Other

DPR100/180/250			
RS-232		RS-485	
SW1	Left	SW1	Left
SW2	Left	SW2	Left
SW3	Right	SW3	Left

Please consult the Communications Option manual for your model DPR on where the switches are located.

DPR controller configuration and addressing

3

This chapter describes how to configure a DPR controller for the system using Quick Builder. For each configuration procedure, there is detailed information covering all supported DPR devices.


The Quick Builder controller configuration tasks are described:

For:	Go to:
Steps for defining a DPR channel	page 14
Steps for defining a DPR controller	page 19
Using Quick Builder to define an address for a point parameter value	page 21
Address syntax for DPR3000	page 22
Address syntax for DPR100	page 22
Address syntax for DPR180	page 23
Address syntax for DPR250	page 23

Defining a DPR channel

You need to define a channel for every connection the server uses to communicate with the DPR controllers.

To define a channel using Quick Builder:

- 1 Click  to add a channel.
- 2 In the Add Items dialog box, select Channel as the item and DPR as the channel type.
- 3 Enter the channel details on the Main property page for the channel. For help with the channel definitions, see DPR channel Main properties.
- 4 To complete the channel definition, click the Port tab and define either a serial or terminal server port. See “DPR Port properties” on page 16.

DPR channel Main properties

Use the Main tab to enter the basic channel properties for a DPR channel.

Property	Description
Name	Type a unique name for the channel. A maximum of 10 alphanumeric characters can be used. Double quotation marks and spaces are not allowed.
Description	(Optional) Type a description of the channel. A maximum of 30 characters can be used, including spaces.
Marginal Alarm Limit	<p>The communications alarm marginal limit at which the channel is declared to be marginal. When this limit is reached, a high priority alarm is generated. A channel barometer monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer increments by 2 or more, depending on the error and decrements for each good call.</p> <p>To calculate an acceptable limit, multiply the square root of the number of controllers on the channel by the Marginal Alarm Limit defined for those controllers. (Normally, you specify the same value for all controllers on a channel). For example, if there are 9 controllers on the channel and their Marginal Alarm Limit is set to 10, the value would be [3 is square root] x 10 = 30.</p>

Property	Description
Fail Alarm Limit	<p>Communications alarm fail limit at which the channel is declared to have failed. When this barometer limit is reached, an urgent alarm is generated.</p> <p>Set to double the Marginal Alarm Limit value specified for this channel.</p>
Connect Timeout	<p>Amount of time, in seconds, the server will wait to connect to the controller before abandoning the connection. Type a new value in this field if you do not want the default, 10 seconds.</p> <p>Use the default value unless the communications line has a high error rate or unless you are using modems.</p>
Read Timeout	<p>Amount of time, in seconds, that the server will wait for a reply from the controller. Type a new value in this field if you do not want the default, 2 seconds.</p> <p>Use the default value unless the communications line has a high error rate or unless you are using modems.</p>
Item Type	Shows the type of item specified when this item was created.
Last Modified	Shows the date of the most recent modification to this channel's property details.
Item Number	This field displays the unique item number currently assigned to this item by Quick Builder. You can change the item number displayed in this field if you need to match your current server database configuration. The item number must be between 1 and the maximum number of channels allowed for your system.

DPR Port properties

The Port tab defines the communication-related properties for a channel. The **Port Type** for DPR can be:

- **serial**. A serial communications interface, such as RS-232. See “Serial port properties” on page 16.
- **terminalserver**. A communications link that enables controllers with a serial interface to be connected to a LAN. See “Terminal server port properties” on page 18.
- **LANvendor**. Not applicable for DPR.

Serial port properties



Note

The Serial Port settings must match the settings on your communication devices.

Property	Description
Serial Port Name	The device name of the serial port.
Baud Rate	The number of data bits per second. The default is 9600.
Number of Data Bits	The number of data bits used for transmission. The default is 8.
Stop Bits	The number of stop bits used for transmission. The default is 1.
Parity	The parity verification used on the port. The default is NONE.
Checksum	Not applicable. Use the default, None.
XON/XOFF	Not applicable. Use the default, None.

Property	Description
Handshaking Options	<p>RS-232</p> <ul style="list-style-type: none"> <li>• Enable RTS/CTS flow control. Select if you want to use RTS/CTS for flow control to stop a receiver from being overrun with messages from a sender. <li>• Detect DCD. Select if the Data Carrier Detect communication status line of the COM port requires monitoring (usually when using modem or microwave linking). When selected, the communications fails if the desired COM status line is not high—for example, on a dial-up link connection for a modem. <li>• Detect DSR. Select if the Data Set Ready communication status line of the COM port requires monitoring (usually when using modem or microwave linking). When selected, the communications fails if the desired COM status is not achieved. <p>RS-422. No options available.</p> <p>RS-485</p> <ul style="list-style-type: none"> <li>• Enable Stallion RS-485 Half Duplex. Select if you are using Stallion EasyConnection RS485 communication. Do not select if you are using RS-422 communication. <li>• Echo (Required for RS-485 2-wire ports). Select so that the server expects the messages it sends to the port on the transmit line to be echoed back on the receive line. For example, select this if you are using a Stallion EasyConnection adapter. For RS-485 connections using a Black Box Converter, leave the box unselected (no echo).


Terminal server port properties

Property	Description
Terminal Server TCP Host Name	The name and port number of terminal server to which the channel is connected.
Terminal Server TCP Port No	You can specify either a TCP host name or an IP address, but it must match the TCP host name used when you installed and internally configured the terminal server.
Idle Timeout	The time, in seconds, the channel waits for a successful connection to the server before closing the connection. A value of 0 indicates that the connection is never closed.
Checksum	Not applicable. Use the default, None.

Defining a DPR controller

Each DPR device connected must be configured in the server as a controller.

To define a controller using Quick Builder:

- 1 Click  to add a controller.
- 2 In the Add Items dialog box, select Controller as the item and DPR as the controller type.
- 3 Enter the property definitions for the controller on the controller Main property page.

DPR controller Main properties

Use the Main tab to define the basic properties for a DPR controller.

Property	Description
Name	Type a unique name for the controller. A maximum of 10 alphanumeric characters can be used. Double quotation marks and spaces are not allowed.
Description (optional)	Type a meaningful description for this controller. A maximum of 30 characters, including spaces, can be entered.
Channel Name	The name of the channel on which the controller communicates. In the list of channel names, click the name. You need to have defined the channel in order for it's name to appear in the list.
Marginal Alarm Limit	The communications alarm marginal limit at which the controller is declared to be marginal. When this value is reached, a high priority alarm is generated. This limit applies to the controller barometer which monitors the total number of requests to the controller and the number of times the controller did not respond or response was incorrect. The barometer increments by 2 or more, depending on the error and decrements for each good call. Type a new value in this field if you do not want the default, 25.

Property	Description
Fail Alarm Limit	<p>The communications alarm fail limit at which the controller is declared to have failed. When this barometer value is reached, an urgent alarm is generated.</p> <p>Type a new value in this field if you do not want the default, 50. To determine an acceptable limit, double the Marginal Alarm Limit value specified.</p>
Controller Type	<p>Select one of the following:</p> <ul style="list-style-type: none"> • DPR3000 • DPR100 • DPR180 • DPR250
Device Address	Enter the device network address.
Item Type	Shows the type of item specified when this item was created.
Last Modified	Shows the date of the most recent modification to this channel's property details.
Item Number	<p>This field displays the unique item number currently assigned to this item by Quick Builder. You can change the item number displayed in this field if you need to match your current server database configuration. The number must be between 1 and the maximum number of controllers allowed for your system.</p>

Defining a DPR address for a point parameter value

Entering an address


Notes on addressing

- Do not configure points that reference addresses that are outside the addresses provided for each controller. This might result in errors when the server attempts to read these addresses.
- If using a raw Modbus address to reference data (for example, 0200h), make sure you include the data format when applicable (that is, IEEEFP or, for status information, bit number).
- If the drift deadband is set to anything other than 0, changes in the field might not appear on the server. Field changes need to be greater than that specified by the drift deadband before the change is reflected in the server.

For **PV Source Address**, **Source Address**, and **Destination Address** the format for a DPR controller address is:

ControllerName Location

Part	Description
<i>ControllerName</i>	The name of the DPR controller.
<i>Location</i>	The location in the controller where the value is recorded. Location syntax can be entered as either: <ul style="list-style-type: none"> • “DPR3000 syntax” on page 22 • “DPR100 syntax” on page 22 • “DPR180 syntax” on page 23 • “DPR250 syntax” on page 23

If you would like help with the address location, you can use the Address Builder. To display the Address Builder, click  next to **Address**. For details, see the help.

DPR3000 syntax

Location syntax	Description	Modbus address
ANALOG <i>n</i>	Analog Inputs where n=1 to 32	0000h to 003Eh
DIGITAL <i>n</i>	Digital Inputs where n=1 to 12	0040h to 0056h
WRTCOM <i>n</i>	Wrt Comm PVs where n=1 to 32	0100h to 013Eh
ADDRESS <i>BIT</i>	Alarm Status	0600h to 060Bh
ADDRESS <i>BIT</i>	Printer Status	0900h to 0901h

where

ADDRESS. Register location where data resides (in hexadecimal).

BIT. Bit number within register where data resides. The server always starts its bit addressing from 0.

Example

DPRCNT ANALOG 1

Reads analog input 1.

Generic address examples (*ADDRESS BIT*):

DPRCNT 0901 0

On a DPR 3000, reads a status point looking at an address of 0901, bit 0 (relays what mode the printer is in).

DPR100 syntax

Location syntax	Description	Modbus address
ANALOG <i>n</i>	Analog Inputs where n=1 to 6	1800h to 180Ah
COM <i>n</i>	Comm Values where n=1 to 6	1818h to 1822h
DIGITAL <i>n</i>	Digital Inputs where n=1 to 4	1840h to 1846h
MATH <i>n</i>	Math Values where n=1 to 6	1850h to 185Ah
WRTCOM <i>n</i>	Wrt Comm PVs where n=1 to 6	1000h to 100Ah
ADDRESS <i>BIT</i>	Alarm Status	0100h to 010Bh
ADDRESS IEEEEFP	Batch Number	0200h
ADDRESS <i>BIT</i>	Printer Status	0800h to 0802h
ADDRESS IEEEEFP		
ADDRESS <i>BIT</i>	Relay Status	0C00h

where

ADDRESS. Register location where data resides (in hexadecimal).

BIT. Bit number within register where data resides. SCAN 3000 always starts its bit addressing from 0.

Example

Generic address examples (*ADDRESS BIT*):

DPRCNT 0C00 5

On a DPR 100, reads a status point looking at an address of 0C00, bit 5 (the status of relay six).

DPR180 syntax

Location syntax	Description	Modbus address
<i>ANALOG n</i>	Analog Inputs where n= to 24	1800h to 182Eh
<i>COM n</i>	Comm Values where n= to 24	1880h to 18AEh
<i>MATH n</i>	Math Values where n=1 to 24	18C0h to 18EEh
<i>DIGITAL n</i>	Digital Inputs where n=1 to 36	1A00h to 1A02h
<i>WRTCOM n</i>	Wrt Comm PVs where n=1 to 24	1000h to 102Eh
<i>ADDRESS BIT</i>	Alarm Status	0100h to 0110h
<i>ADDRESS BIT</i>	Printer Status	0800h to 0802h
<i>ADDRESS IEEFP</i>		
<i>ADDRESS BIT</i>	Relay Status	0C00h to 0C02h

where

ADDRESS. Register location where data resides (in hexadecimal).

BIT. Bit number within register where data resides. The server always starts its bit addressing from 0.

DPR250 syntax

Location syntax	Description	Modbus address
<i>ANALOG n</i>	Analog Inputs where n=1 to 64	1800h to 187Eh

Location syntax	Description	Modbus address
COM <i>n</i>	Comm Values where n=1 to 32	1880h to 18BEh
MATH <i>n</i>	Math Values where n=1 to 32	18C0h to 18FEh
DIGITAL <i>n</i>	Digital Inputs where n=1 to 48	1A00h to 1A02h
WRTCOM <i>n</i>	Wrt Comm PVs where n=1 to 32	1000h to 103Eh
ADDRESS BIT	Alarm Status	0100h to 0110h
ADDRESS BIT	Printer Status	0800h to 0802h
ADDRESS IEEEEFP		
ADDRESS BIT	Relay Status	0C00h to 0C02h

where

ADDRESS. Register location where data resides (in hexadecimal).

BIT. Bit number within register where data resides. SCAN 3000 always starts its bit addressing from 0.

Server and Station tasks for DPR

4

This chapter describes tasks for the DPR controller that you perform either on the server or from any Station.

For:	Go to:
Testing communications with the server	page 26
Troubleshooting communication errors	page 27
Troubleshooting point configuration and scanning errors	page 28

Testing communications with the server

A diagnostic utility, **dprtst**, comes with the server software and can be used to test communications between the server and the DPR devices after channels and controllers have been configured.

Before testing, complete the following:

- 1 Set up the DPR devices.
- 2 Connect all cables.
- 3 Use Quick Builder to define channels and controllers and download to the server without errors.



Note

The server need not be running while using the utility as long as the server database service is running.

To test communications:

- 1 Open a Command Prompt window and at the prompt type **dprtst**.
- 2 Follow the screen prompts. When prompted for the channel number, enter **chn01** for channel 1 and so on. You may read any data addressable by the server.

For help while using this utility, type **?**.

Example

```
C:\>dprtst
Enter LRN or device name of channel
chn01
Enter command:
find 1,4
FIND device with id 1 to 4, at 16-Sep-97 14:06:52
Device 1 ?
Device 2 ?
Device 3 ? ...responding
Device 4 ?
Enter command:
Q
```

After verification that the server is communicating with the DPR device you can build points to reference controller addresses.

Troubleshooting communication errors

If any errors are encountered, review the configuration steps.

Error code 0106 (Device Timeout)

No response was received from the device.

Error code 8102 (MODBUS error 2 - illegal data address)

You either specified an illegal address or an illegal number of addresses.

Troubleshooting point configuration and scanning errors

Point configuration download errors

84E0h

You specified an invalid address for this type of device.

8426h

You specified an invalid data format for this type of device.

Scanning errors

Errors can be viewed by opening loga.

0106h

A request to the device timed out. This could be caused by a communication setup problems (for example, wrong address and/or baud rate, and so on).

8102h

An invalid address has been reported by the DPR device. This could be caused by user specifying the wrong address, the wrong data type or the wrong device type.

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Honeywell EXCEL 5000 Interface
Reference

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CONTENTS

Getting started

1

This reference describes how to set up, configure, and test EXCEL 5000 controller communications with the server.

Complete each step before commencing the next.

Steps for connecting and configuring an EXCEL 5000 controller:

Steps	Go to:
Choosing which EXCEL 5000 interface to use	page 9
If you have XPC500 cards, configure their communications characteristics before installing the server software	page 30
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Define points with Quick Builder	page 85

Choosing which EXCEL 5000 interface to use

There are two main EXCEL 5000 interfaces supported by the Honeywell system. Each interface is best suited to particular tasks and has its own benefits over the other interface. These two EXCEL 5000 interfaces are mutually exclusive on your system. The system licence can only support one of these interfaces and will exclude the other from running on your system.

EXCEL 5000 Direct Interface

**Attention**

The EXCEL 5000 Direct Interface is applicable to EBI only.

Select the EXCEL 5000 Direct Interface if you want to take advantage of controller based alarming, native point structures and to minimize C-Bus engineering considerations.

The interface makes use of point server technology, allowing points to be discovered on-line. Controller and C-Bus objects are represented as flexible points and EXCEL 5000 data points will be displayed with all supported attributes.

It is also possible to use Quick Builder to import points from CARE and download to the server.

EXCEL 5000 Scan Task Interface

Select EXCEL 5000 Scan Task Interface if you are upgrading a server that is already using this interface. For most new installation the EXCEL 5000 Direct Interface is the recommended choice. However, the scan task interface may be used when point combining or server-based alarming are required.

The EXCEL 5000 Scan Task Interface is also required for dial-up systems.

Support and documentation for EXCEL 5000

EXCEL 5000 models supported

The server supports the following EXCEL 5000 controllers:

- XL50
- XL80
- XL100
- XL500 (with or without Distributed I/O)
- XL600
- E-Link (Zone Manager)
- O-Link

On an EBI system, the server supports the following modem devices:

- XM100A
- XDM506

Controllers can be connected to the server via an XPC500 card or COM port via a C-Bus connection. For an EBI system, controllers can also be connected to the server via BNA (models BNA-1C and BNA-2CS), LON and/or, by using a remote modem connection with either an XM100A or XDM506 device.

Networked XLNET Node



Note

Networked XLNET Node is only available to EBI systems for use with the EXCEL 5000 Scan Task Interface.

Other documentation for EXCEL 5000

Read the following documents before installing and configuring EXCEL 5000.

- *Installation and Mounting Instructions* (for EXCEL 5000 controllers)
- *XPC500 Mounting Instructions* booklet
- *Installation Guide* (for modem and hardware requirements not covered in this reference)

EXCEL 5000-specific terms

CARE

Computer Aided Regulation Engineering. A software tool used to configure points on EXCEL 5000 controllers.

User Address

The point name used by the controller to identify the point. User Addresses are listed in the CARE output file.

HVAC

Heating, Ventilation and Air Conditioning.

Supported architectures



Note

For a list of supported connections for your system see “EXCEL 5000 models supported” on page 10.

Connection

EXCEL 5000 controllers connect to the server via a C-Bus that connects by:

- An XPC500 communications card installed in the server
- A COM port on the server via RS-485/232 converter (This is known as a Serial C-Bus.)
- A Building Network Adapter (BNA) C-Bus device

EXCEL 5000 controllers can also connect to the server via a LonWorks network. The LonWorks network connects by a LonWorks Network Interface.

Each EXCEL 5000 controller and each XPC500 card contain a communications submodule that enables communication between the two (either an XD508 or XD505). If using a Serial C-Bus or BNA, a communications submodule will still be required on each EXCEL 5000 controller.

XPC500 Cards

Up to three XPC500 cards can be installed in the server.

If you have an EBI system that requires more than three XPC500 cards, a remote EXCEL 5000 point server or a Networked XLNET node must be used. (A Networked XLNET Node is an installable client software option.) See the *Installation Guide* for information on installing Networked XLNET Node.

BNAs

Up to 10 BNAs can be logically connected to the server. In an EBI system, if more than 10 BNAs are required, a remote EXCEL 5000 point server or a Networked XLNET node must be used.

Serial C-Busses

Only one serial C-Bus may be configured on the server. On an EBI system, if more than one serial C-Bus is required a remote EXCEL 5000 point server or a Networked XLNET Node must be used.



Note

When a serial C-Bus is configured all other COM ports are disabled and unusable for normal serial operation.

LON Network Interfaces

The number of LonWorks Network Interfaces you can install for connecting to the EXCEL 5000 controllers is only limited by the hardware resources of your server computer and the limitations outlined in your LonWorks/LNS documentation. LonWorks Network Interfaces can be connected via COM ports, LonWorks routers via Ethernet or as PCI cards directly into your computer.

System architectures

The following figures show possible system architectures.

Figure 1 EXCEL 5000 interface system architecture (EBI systems only)

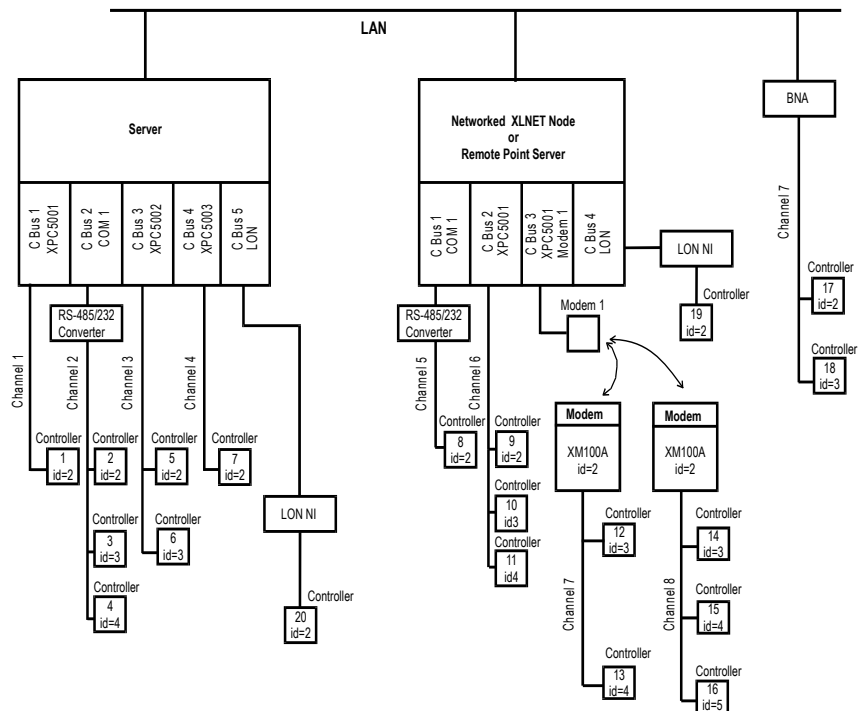
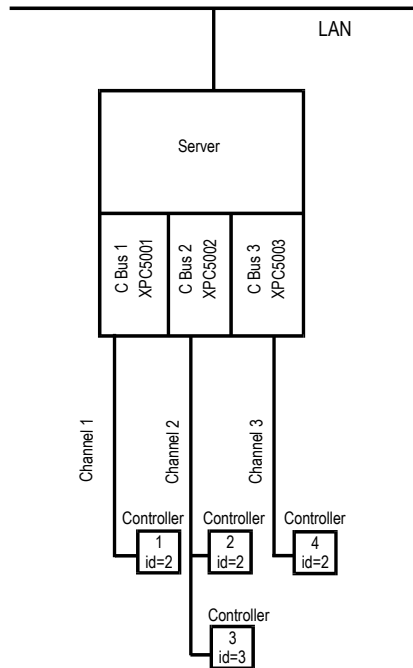


Figure 2 EXCEL 5000 interface system architecture (all other systems)



Remote (Dial-Up) C-Bus connection



Note

This topic is applicable only if you are using the EXCEL 5000 Scan Task Interface on an EBI system.

Each XPC500 card on the server is capable of handling two modems. Each modem connects to the card using a standard RS-232 cable. If more than six modems are required, a Networked XLNET Node must be used.



Note

A modem must be qualified by the XPC500 card before it can be used (see the installation instructions that came with the card).

On the remote channel, either an XM100A or XDM506 device is used. From the server perspective, there is no difference between the XM100A and the XDM506. They operate using the same protocol messages:

- XM100A connects to a maximum of 28 EXCEL 5000 controllers using the standard XW570 cables. (28 controllers is theoretical only—in reality there would typically be 2 to 5.) The number of controllers to connect depends on factors such as baud rate, total number of points required, and the cost of calling (the more devices connected the more time required to gather information).

**Note**

The following controller types have the XM100 modem capabilities built in: XC5010, XCL5010, XL100C and all XL50 controller types.

- XDM506 is a daughter board that fits inside one XL100 controller to enable the server to communicate with that single controller. No other controllers can be connected to it.

**Note**

After reading this reference, see the *Building Management Guide* for further information required to configure remote controllers.

Redundant C-Bus connections

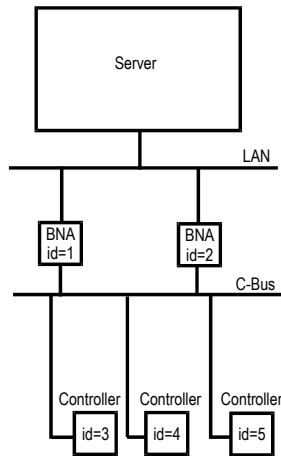
**Note**

This topic is applicable only if you have an EBI system using redundant C-Bus connections and BNAs on the EXCEL 5000 Scan Task Interface.

Single server with redundant channel

The EXCEL 5000 channel is configured as a redundant channel. In the event that one of the links fail, the communications is directed through the other link.

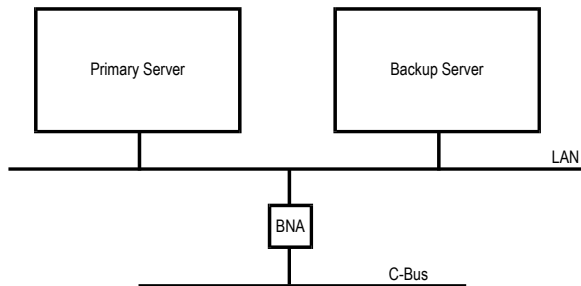
Figure 3 EXCEL 5000 redundant channel



Redundant servers with single channel

Both the primary and the backup server can be configured to use the same BNA. In the event of a failover, the primary server disconnects from the BNA allowing the backup server to connect to the BNA. This alleviates the need to have two C-Bus interfaces.

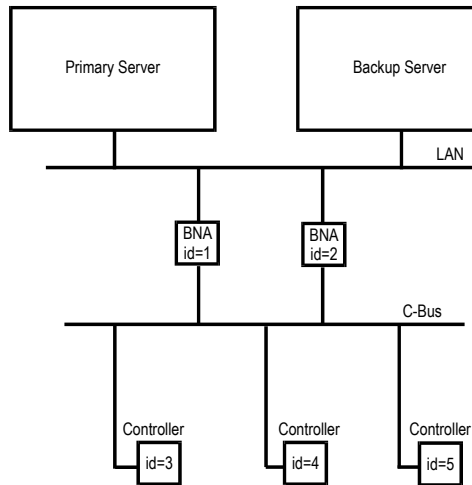
Figure 4 EXCEL 5000 single channel with redundant servers



Redundant servers with redundant channels

Both the primary and the backup server have the EXCEL 5000 channel configured as a redundant channel. This allows redundancy to be achieved down to the C-Bus level.

Figure 5 EXCEL 5000 redundant channels with redundant servers



Installing a C-Bus for XPC500, serial and BNA connections

Most communication problems experienced on a C-Bus Channel can be traced to physical wiring faults, incorrect C-Bus termination and C-Bus installation faults.

C-Bus wiring and layout rules

The maximum C-Bus length is limited by wire type and baud rate. In general, the maximum length decreases with the use of shielded (or higher capacitance) wire and with increased C-Bus transmission speed.

A maximum baud rate of 76,800 baud allows the C-Bus length to be up to 1200m with all approved wire types. Use of untested wire types is not recommended.

System performance (C-Bus throughput) does not improve measurably with C-Bus baud rates above 76,800 and C-Bus length is severely limited. Therefore limit the baud rate to 76,800 baud unless required by job specification and observe the following wiring guidelines.



Caution

Do not connect shield to controller common terminals.

Use of shielding

- Use only unshielded cable types unless:
 - Customer has specifically requested use of shielded cable
 - Bus wiring is in high EMI environment and not inside a dedicated metallic conduit.
- Connect shield through each device, and one end to the local earth point; or leave bus segment shields separate, connecting one end of each shield segment to a local earth point.
- Do not connect shield to controller common terminals (such as Terminal 15 of XC5010/XC6010 Computer Module in Excel 500/600 Controller or Terminal 33 of Excel 80/100 Controller).

Cabling rules

- No T-TAPS, STUBS, STARS, SPURS of any length are allowed in C-Bus wiring. Always use point-to-point, daisy-chain wiring, including inside the cabinets.

- AK3702: Use this 18 AWG (0.8012 sq. mm) unshielded twisted pair cable as the primary non-plenum cable at all data speeds. (Belden 9571 is similar, but it has not been tested.)
- AK3728: Use this low loss 18 AWG (0.8012 sq. mm), shielded cable for minimizing cost and maximizing distance for shielded, non-plenum cable applications.
- Belden 9841: This cable may be used for shielded, non-plenum cable applications.
- AK3744B: Use this 18 AWG (0.8012 sq. mm) unshielded twisted pair, plenum rated cable in a red color jacket when plenum rated cables are required.
- The specific cable distance limits for different cables, and at different baud rates are detailed in the following table.

Table 1 Maximum cable lengths

Data Rate (Kbaud)	AK3702 Unshielded	Belden 9841	AK3728 Shielded	Belden 9571	AK3744B Plenum
9.6	1200m	1200m	1200m	TBD	1200m
19.2	1200m	1200m	1200m	TBD	1200m
38.4	1200m	1200m	1200m	TBD	1200m
76.8	1200m	1200m	1200m	TBD	1200m

C-Bus submodule usage

The C-Bus Submodules (XD505, XD505A, and XD508) used on each controller must be compatible with all other C-Bus Submodules on the same C-Bus. The C-Bus Submodules do not have to be consistent across the various remote sites, but they must be consistent within each site. Observe the following compatibility guidelines for C-Bus Submodules:

- XD505 and XD505A are electrically (on the C-Bus) identical. Neither has bus termination capability. Both have 4.7K-ohm pull-up/pull-down biasing resistors that can not be disabled. These submodules support data rates of 4800 and 9600 baud.
- XD508 provides capability for combination 118-ohm termination resistor and 1K-ohm pull-up/pull-down biasing resistor for the C-Bus cable ends. It operates at the following baud rates: 4.8, 9.6, 19.2, 38.4, and 76.8 baud. The bus throughput does not increase beyond 76.8K baud.
- XD508 and X505/XD505A cannot be mixed on the same bus with or without repeaters.

Repeaters

The 14507324 Excel High Speed Repeater (Repeater) can be used to increase the C-Bus length or to buffer a segment of a C-Bus where it is necessary to create a branch off the main C-Bus.

“C-Bus device layout examples” on page 21 shows samples of C-Bus layouts using Repeaters. Up to 3 repeaters can be used on a C-Bus.

If you have an EBI system, the use of remote EXCEL 5000 point servers or Networked XLNET Nodes and LAN/WAN connectivity to the server removes the necessity to use repeaters to increase C-Bus length.

It is recommended to use remote EXCEL 5000 point servers or a Networked XLNET Node rather than an extended C-Bus for connection to controllers in a remote part of a large facility.

C-Bus termination

C-Bus termination requirements vary with the number of devices on the bus and with the C-Bus Submodule type used. Observe the following guidelines for the bus termination resistor and biasing resistor. “C-Bus device layout examples” on page 21 shows termination requirements for various C-Bus layouts.

Observe the following compatibility guidelines for C-Bus termination and biasing resistors:

- If a C-Bus has 15 or less XD505/XD505A Submodules and/or repeaters, always terminate the bus at both ends. The termination can be accomplished by connecting the biasing network in the CPU to the bus as detailed in the following table.

Table 2 Termination 1

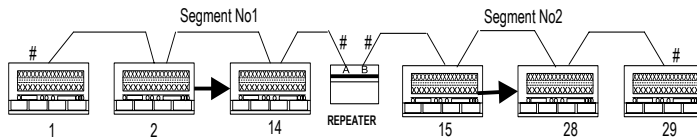
Device	Connection
XC5010/XC6010 (Excel 500/600 Controller)	Terminal 13 to 16 and Terminal 14 to 17
Excel 80B/100 B Controller and XM100A Modem Device	Terminal 31 to 34 and Terminal 32 to 35
Excel Link	Terminal 20 to 23 and Terminal 21 to 24
XPC500 Interface Board	See the <i>Installation Guide</i> for details.
BNA (applicable to EBI only)	Switch on BNA backplane. See the <i>BNA Installation Manual</i> for details.

- If a C-Bus has 16 or more XD505/XD505A Submodules and/or repeaters, terminate/bias one end only, preferably at the end device that is farthest from its adjacent device.

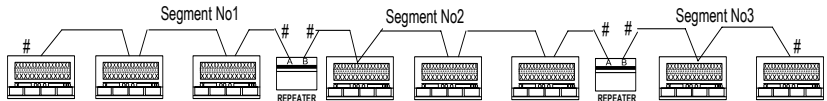
- When using XD508 Submodules on the bus, biasing/termination is required at both ends and can be accomplished with the submodule DIP switch turned ON at the end devices.
- Excel High Speed Repeater provides an on-board capability for switching in biasing/termination network at each port as needed. If it is an end device, a Repeater can be used to bias/terminate the bus as necessary in accordance with other rules in this section. The Repeater itself represents one unit load on the bus.
- Never leave the bus completely unterminated.

Figure 6 C-Bus device layout examples

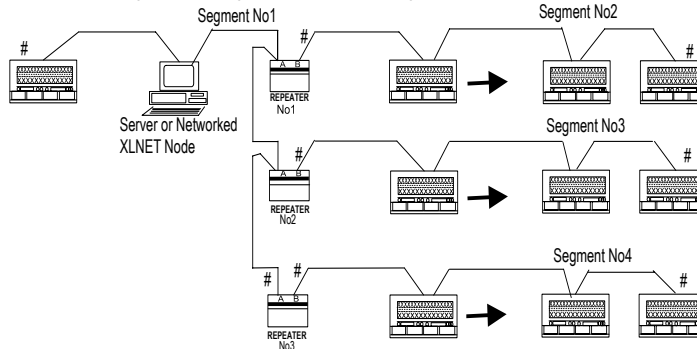
Single Repeater using Two C-Bus Segments. Each Segment up to 16 Devices



Two Repeaters using Three C-Bus Segment. Each Segment up to 16 Devices



Repeaters in Series Linking Four C-Bus Segments to a server. Each Segment up to 16 Devices



Terminate Bus Here. Maximum of 3 Repeaters Between any Two

System configuration and I/O summary

Examine the building control system in architectural terms as follows and develop a basic system configuration diagram:

- Determine geographical location of controller panels in the building.
 - Will panels be located in a main equipment room or in one central location where one local C-Bus is sufficient?
 - Will panels be located in multiple, wide-spread equipment rooms where one or more remote EXCEL 5000 point servers or Networked XLNET Node c-busses or Remote (dialup) c-busses are required?
- Does C-Bus distance and baud rate conform to panel locations?
 - A 9600 baud C-Bus can extend up to 1200m.
 - A 14507324 Excel High Speed Repeater can extend the C-Bus distance beyond the standard distance.
 - 2400 Baud modems and XM100A Modem Device/XDM506 Modem Submodule can extend the distance to remote sites.

Installing a LonWorks network for EXCEL 5000 via LON



Note

This topic is applicable only if you have an EBI system.

When installing a bus using a LON connection, communication to the EXCEL 5000 controllers is via a LonWorks network. This requires a LonWorks Network Interface (and its associated driver software) to be installed and connected to the LON Bus wiring. Controllers also need to be connected via their LON-Bus connections.

Excel 5000 via LON is supported in version 2.06 of the Excel 50/500 firmware.

Bus wiring

See the “LonWorks Bus Wiring” section of the *Excel 500/600 Control System Installation Instructions* (Document number EN1R-1047) for bus topologies, wiring rules, cable lengths and types.

Termination

Use connections marked ‘LON-Bus’ on the controller termination diagrams.

Controller Type	Terminations
Excel 500	Terminals 12 and 13 on the XC5010C CPU Module.
Excel 500 – XCL5010	Terminals 1 and 2 on the XDL505 Communications Sub-module.
Excel 50	Terminals 1 and 2 on the XDL505 Communications Sub-module.

Virtual bus ID

The virtual bus ID is a property of a controller that is used to identify separate logical busses on the same physical LON network when communicating via LON.

A virtual bus ID greater than zero enables EXCEL 5000 LON communications in the controller. A value of zero indicates the controller communicates via the “physical” C-Bus connection.

The virtual bus ID can be configured in CARE 4.0 before downloading or via the MMI after a cold start of the controller.

LonWorks network configuration

Supported network interfaces

Several LonTalk adapters are supported for use with the Excel 5000 via LON interface including directly connected interfaces such as PCLTA, PCC-10 and routers such as i.LON 1000. The SLTA-10 is not supported by this interface. For a full list of supported network interfaces see the “Hardware” section in the *LonWorks Controller Reference*.

Network interface configuration

There is no specific configuration requirements for the PCLTA-10/20 and PCC-10 network interfaces. Other adapter driver software may need to be set up to start automatically on system reboot or start up.

The i.Lon network adapter requires a user to be logged on to the computer for its “i.LON Configuration Server” program to start. For this reason it is recommended to perform the following:

- Configure the computer to automatically log on at start up.
- Ensure that the i.LON Configuration Server program is in the computer’s “Startup” folder.

The PCLTA-10/20 and PCC-10 network interfaces must be configured to use the high performance software driver.

To do this:

- 1 Log on to Windows with administrator privileges.
- 2 Select **Start > Settings > Control Panel**.
- 3 Double-click **LonWorks Plug ‘n Play**.
- 4 Ensure that the System Image Path is either:
 - \lonworks\images\pclta10 if using a PCLTA-10/20 network interface.
 - \lonworks\images\pcc10 if using a PCC-10 network interface.
- 5 From the **NI Application** list select either:
 - PCL10VNI if using a PCLTA-10/20 network interface.
 - PCC10VNI if using a PCC-10 network interface.
- 6 Click **OK**.

7 Restart the computer.



Note

The PCLTA-20 uses the same images as the PCLTA-10, whereas the PCC-10 uses its own unique images. When installing for the PCLTA-20 you will see the reference to the PCLTA-10 system images. This is normal.

Network architectures examples

The following architectures show methods of connecting to an EXCEL 5000 via LON bus.

Figure 7 EXCEL 5000 via LON (multiple LNS databases)

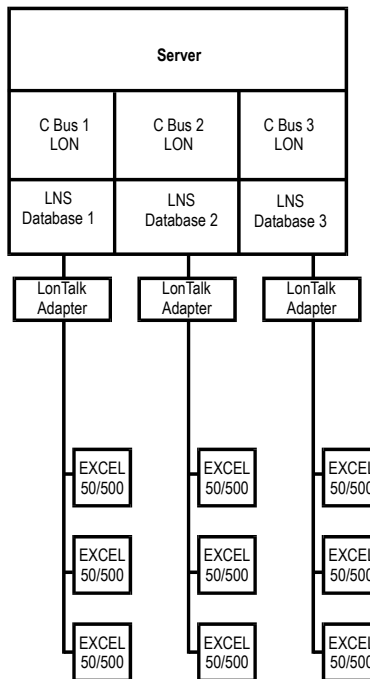


Figure 8 EXCEL 5000 via LON (using Virtual Bus number and single LNS database)

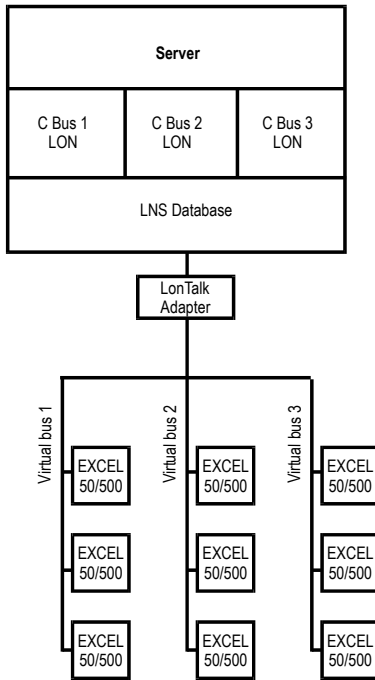
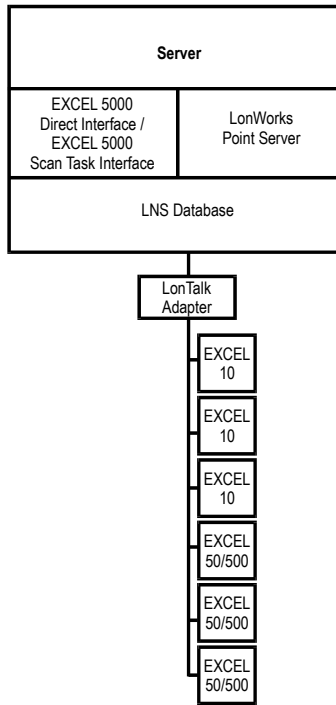


Figure 9 Excel 5000 via LON (concurrent with LonWorks point server)



Note

If multiple LNS databases exist, only one LNS database can be shared with the LonWorks point server.

EXCEL 5000 bus setup

2

This chapter describes how to set up an EXCEL 5000 bus for your system.
The tasks for setting up an EXCEL 5000 bus are:

For:	Go to:
If using XPC500, configure the communications settings on the XPC500 cards	page 30
If using Serial C-Bus, configure the communications settings (applicable to EBI only)	page 33
If using BNA, set up BNA devices	page 35
If using LON, configure LON network (applicable to EBI only)	page 39
Configure C-Busses using the Control Panel applet	page 43
Connect C-Bus cables	

Communications settings for XPC500

XPC500 ISA card

- 1 Configure the communication parameters for the XPC500 card before you install the server software. Make a note of the settings because you need them when using the C-Bus configuration tool. (See “Configuring C-Buses” on page 43.)
- 2 Install the server software.
- 3 After server software installation, configure the C-Bus.

XPC500 PCI card

- 1 Install the server software.
- 2 Shutdown the computer
- 3 Insert the XPC500 PCI card into the computer
- 4 Install the driver for the XPC500 PCI card when prompted by the Hardware wizard. (The driver is located in the \thirdparty folder on the Honeywell CD).

XPC500 card settings for communication

Baud rate

- 9600 (mandatory when using XD505 on a directly connected C-Bus)
- 76800 (recommended when using XD508 on a directly connected C-Bus)
- 9600, 19200, 38400 (other rates possible for XD508 on a directly connected C-Bus)
- 2400 (recommended when using a modem port for remotely connected C-Bus)
- 1200, 4800, 9600 (Other possible rates for modem ports and depending on the type of modem hardware used. See the installation instructions provided with the XPC500 card.)

Allowable I/O (hexadecimal) address for XPC500 ISA card only

- 250 (recommended for first XPC500 card)
- 260 (recommended for second XPC500 card)
- 330 (recommended for third XPC500 card)
- 280, 290, 2A0, 300, 310, 340, 350 (other allowable I/O addresses)

Allowable interrupt (IRQ) for XPC500 ISA card only

- 10 (recommended for first XPC500 card)
- 11 (recommended for second XPC500 card)
- 15 (recommended for third XPC500 card)



Note

Ensure the XPC500 card interrupt and I/O settings do not conflict with other hardware on the system.

Figure 10 XPC500 ISA card settings

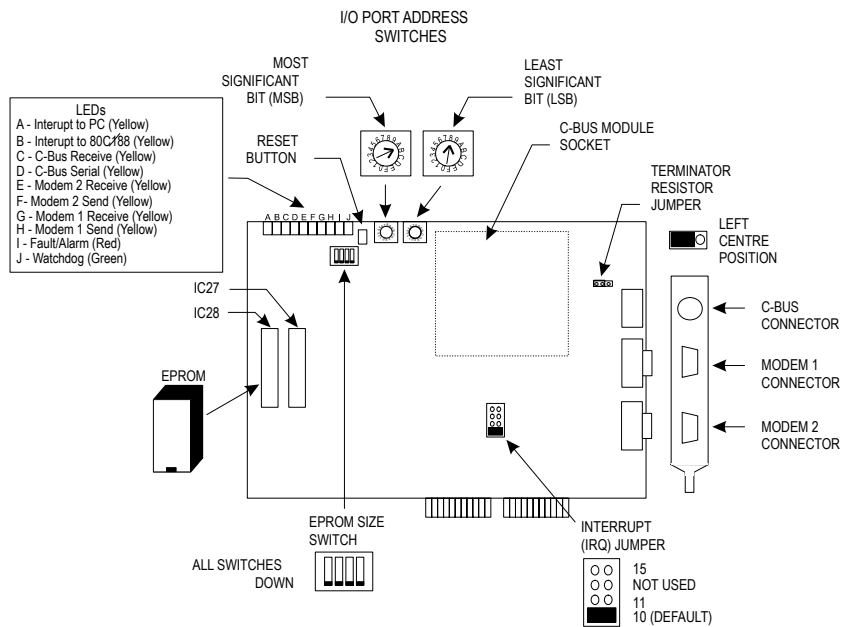
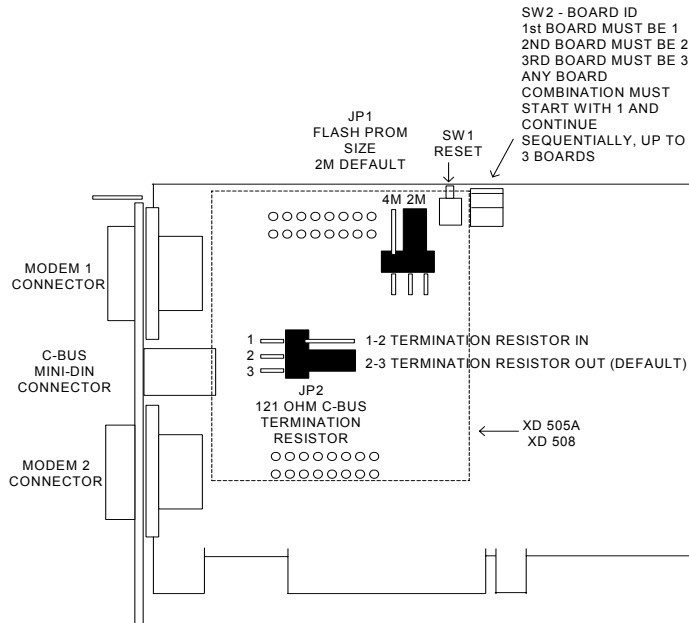


Figure 11 XPC500 PCI card settings



Note

- Do not use the end-of-line terminator resistor on the XPC500 (leave the jumper in the center-left position). If the card is on the end of the C-Bus, use the terminating resistor on the XD508 C-Bus submodule.
- The XPC500 ISA card factory default settings are:
MSB=3 and LSB=0 for I/O Port Address 300h

Communications settings for serial C-Bus



Note

This topic is applicable only if you have an EBI system.

Configuring a Windows system for serial C-Bus communication is a complex manual process. Contact your local Honeywell representative to obtain instructions on configuring Windows for serial C-Bus.

Setting up serial C-Bus using a Blackbox converter

If you use the qualified Blackbox RS-232/485 converter (Model 1C109Ae) for your serial C-Bus connection, you must use the following jumper/switch settings and termination details to ensure proper operation.

Table 3 Internal jumper settings

Switch	Setting	Description
W5	B-C	RTS/CTS
W8	B-C	2 wire
W9	C	0 msec
W15	B-C	Data enabled
W16	A	0.0 ms
W17	E	0.15 ms

Table 4 Internal dip-switch settings

Setting	Description
Term	On
Bias	Off

Table 5 External (front of device) pushbutton setting

Setting	Description
Normal/DLB	Normal

Table 6 Blackbox Converter Serial C-Bus Terminations

Device	Connection
EXCEL 5000 controller CPU to Blackbox converter	Terminal 16 (C-Bus+) to both TxB and RxB. Terminal 17 (C-Bus-) to both TxA and RxA.
Blackbox converter to Server COM port	Standard 25 to 9 pin cable

Communication settings for BNA C-Bus

The following procedures describe how to set up a BNA for EXCEL 5000. (For general information about setting up a BNA, see the *Q7055A Building Network Adapter BNA-1C/2CS/2DN NA Installation Instruction and User Manual*, EN1B-1020GE02R0500.)

The major steps involve:

- Setting up the FTP server on either the Honeywell server computer or a stand-alone computer
- Copying the BNA firmware to the FTP server
- Specifying the IP address and loading the firmware

Setting up an FTP server for BNA firmware download

To install Microsoft FTP Service:

- 1 **Start > Settings > Control Panel.**
- 2 Double-click **Add/Remove Programs** and click **Add/Remove Windows Components**.
- 3 Click on the text **Internet Information Service (IIS)**.
Do not select the checkbox.
- 4 Click **Details...** and select the **File Transfer Protocol (FTP) Server** checkbox.
- 5 Click **OK** to close the Internet Information Services (IIS) dialog box and click **Next** to proceed with the installation.
- 6 Follow the prompts.

Copying the BNA firmware to the FTP server

To copy the BNA firmware to the FTP server:

- 1 From the Honeywell CD, go to `thirdparty\bna_firmware` and copy: `bna_SUSI_server_ver 1.0.0.x.bin` (where *x* is the revision letter) to `c:\inetpub\ftproot`.
- 2 Rename `c:\inetpub\ftproot\bna_SUSI_server_ver 1.0.0.x.bin` to `bna_SUSI_server.bin`.

Make sure the folder options are not hiding file extensions for known file types.

Specifying the IP address and loading the firmware

To specify the IP address and load the firmware:

- 1 Connect a null modem RS-232 cable from the COM port on the computer to the BNA 9-pin serial port.
- 2 Start the HyperTerminal program on the computer and set up the communications parameters as follows:

Parameter	Setting
Bits per second	115200
Data bits	8
Parity	None
Flow control	None
Terminal emulation	VT100
Stop bits	1

- 3 A message should be displayed indicating the current password for root is not defined. There is no old password, so just press ENTER to continue. If no text displays on the screen, use a paperclip to reset the BNA.
- 4 After reset you are prompted to enter new password. Enter new password.
- 5 Record the new password and file it somewhere safe and recallable.
The following messages appear:
user 'root' logged on
BNA bootloader
- 6 From the BNA bootloader prompt, type **np modify**.
- 7 Enter the IP address, network mask and gateway. This is the addressing that will be assigned to the BNA. (Use 0.0.0.0 if no gateway is used.)
- 8 You should be prompted to save. Type **y** to save. You should notice a “restarting” message.
- 9 You can verify the settings by typing **np display**.
- 10 From the bootloader prompt type **dc modify**.

- 11 Enter the following:
 - IP address of FTP server.
 - Complete path to firmware `\bna_susi_server.bin` (make sure that you start with a “\” because this points to the `ftproot` folder) AND then follow with the name of the firmware.
 - Username on FTP server—leave as the default, which is “anonymous”. There is no password for anonymous (Press ENTER).
- 12 Verify the settings by typing **dc display**.
- 13 From the bootloader prompt, type **dc test**.
- 14 Check that (by looking for an “OK” following each test):
 - A network connection is established
 - The FTP server is found
 - The OS file has been found
- 15 From the BNA bootloader prompt, type **load**. The OS firmware should now be loaded to the BNA.
- 16 Disconnect the serial cable from BNA.

Now that the IP address has been defined and BNA firmware has been loaded/ flashed, you can connect to the BNA using the **telnet** utility from a command prompt. (Note that you must reset the BNA using the paperclip before using the **telnet** utility.)

Changing a BNA’s configuration

You only have to perform this task if you need to upgrade the BNA’s firmware or change its IP address.

There is a menu entry with BADMAN header (Board and Diagnostic Manager) that allows you to reassign the IP address, reload new versions of firmware and conduct diagnostics.

To change the configuration:

- 1 On the BADMAN main menu, “Please Select” appears at the bottom of the screen. Enter **E**. (This is the “Bootloader Shell” pick.)
The BNA Bootloader prompt is displayed.
- 2 From the BNA Bootloader prompt, change the configuration using the commands described in “Specifying the IP address and loading the firmware” on page 36.

Redundant BNA channels

Redundant BNA channels can only be configured with the EXCEL 5000 Scan Task.

You define each BNA in the C-Bus configuration tool, ensuring that each BNA has a unique C-Bus ID.

Select the Show Redundant Link Status option on the Channel Configuration Summary display in Station to enable the redundant links in the channel and controller summary displays in Station.

For information on defining a redundant channel see “Defining an EXCEL 5000 channel” on page 78.

Communication settings for EXCEL 5000 via LON

**Note**

This topic is applicable only if you have an EBI system.

EXCEL 5000 via LON and LonWorks point server

Both the Excel 5000 via LON interface and the LonWorks point server are capable of communicating and accessing point information from Excel 50/Excel 500 controllers. The main difference between the two is the way they access this information.

The LonWorks point server uses “flexible” points, each with the ability to represent many custom-named parameters (for example, NV’s and CP’s) on the server. Each Excel 50/Excel 500 point can be built as a LON NV via CARE. These NV’s can then be accessed as separate parameters of a single flexible point that represents the controller. This type of access is limited to point access with NV updating/alarming. Scheduling or control program parameter (P-registers) access is not possible.

The Excel 5000 via LON interface uses the LonWorks network and LonMark explicit messages to communicate to Excel 50/Excel 500 controllers. This means that all of the functionality (except Firmware Download) available when using other methods to communicate with EXCEL 5000 controllers is available using Excel 5000 via LON and is presented to the operator in the same manner.

The Excel 5000 via LON interface and LonWorks point server can co-exist on the same server and use the same LNS database to access the LON network.

Configuring controllers on the LON Bus

The Excel 5000 via LON interface uses an LNS database to communicate with the LON network. Controllers built on the server must be added to an LNS database and commissioned using an LNS configuration tool. Currently the supported tools to use for this process are Echelon LonMaker for Windows and CARE V4.0.

Populating your LNS database using LonMaker

This process must be performed on the computer where your LON network/LON Network Interface and LonMaker installation resides.

To populate the LNS database:

- 1 Start LonMaker for Windows and select **New Network** to start the Network Wizard.
- 2 Follow the prompts, leaving defaults and entering a Database Name and the Network Interface to communicate on when prompted.
The database will be created and a Network Interface and LON Channel will be added automatically to the schematic.
- 3 Add a “Device” element for every Excel 50/ Excel 500 that needs to be built. When you add a device to the schematic, the “New Device Wizard” appears and guides you through adding and commissioning a device.
- 4 Follow the prompts, leaving all the defaults except the following:
 - **Commission Device** checkbox on the first prompt.
 - **Upload From Device in the External Interface Definition** selection.
 - **Online in the State** selection.
 - Current values in device in the Source of Configuration Properties selection.

After you have populated your LNS database with LonMaker, you need to configure a C-Bus using the C-Bus Configuration Tool. The C-Bus will be a “LON” type (see “Configuring C-Busses” on page 43).



Note

A new LNS database is not required if you are using the EXCEL 5000 via LON interface in conjunction with the LonWorks point server. For example, if Excel 50/Excel 500 controllers (on Excel 5000 via LON) are connected to the same LON Bus as Excel 10 controllers (on LonWorks point server), the same LNS database can be used for both.

Populating the LNS database using CARE 4.0

The following procedure details the process for making a CARE generated LNS Network available for use with EXCEL 5000 via LON. The LNS network generated by CARE firstly needs to be **exported** to the computer where your EXCEL 5000 C-Bus will be configured. It then needs to be **imported** into LNS installation on the same computer. This LNS database then needs to be **initialized**.

Notes

- The process is similar to the process performed to assign an LNS Network to the LonWorks Point Server. If your database is also being used by a LonWorks Point Server, you do not have to perform these tasks again for each interface. The steps outlined for a LonWorks Point Server should be followed and these will prepare the LNS database for use with EXCEL 5000 via LON.
- If you are using the Virtual bus architecture and using the same LNS database for multiple LON busses, you only have to perform this process once for all of these busses.

Complete the following tasks to make a CARE generated LNS Network available for use with EXCEL 5000 via LON.

Setting up an FTP server for LNS export

You only need to complete this task if you are using CARE 4.0 on a computer other than the computer where your EXCEL 5000 C-Bus will be configured.

To install Microsoft FTP Service:

- 1 Select **Start > Settings > Control Panel**.
- 2 Double-click **Add/Remove Programs**
- 3 Click **Add/Remove Windows components**.
- 4 Select the text **Internet Information Services (IIS)**. (Do not select the checkbox).
- 5 Click the **Details** button and select the **File Transfer Protocol (FTP) Server** checkbox.
- 6 Click **OK** to close the Internet Information Services (IIS) dialog box
- 7 Click **Next** to proceed with the installation and follow the prompts.

Exporting the LNS network from CARE

Prerequisites

You have set up an FTP Server for write access and have selected the appropriate download location.

When exporting the LNS network from CARE ensure:

- 1 The the NI channel, as configured in the Network Export dialog, corresponds to the channel that the LonWorks point server uses to connect to the network.
- 2 That the Set to commissioned and the Use template database options are selected.

To import the LNS network for use by EXCEL 5000 via LON:

- 1 Select **Start > Settings > Control Panel** and double-click the **Cbus** icon to start the Honeywell Cbus Configuration tool.
- 2 Define a LON C-Bus. (See “Configuring C-Busses” on page 43).
- 3 If you have not imported any LNS networks to this computer, the LNS Database list is empty. Click **Import** to start the import.
- 4 Enter the location of the LNS Network exported from CARE.
- 5 Enter a new network name or click **Browse** to select an existing LNS Network.
- 6 If required, change the database location.
- 7 Click **Import**. If the LNS Network already exists you are prompted to confirm to replace it.

Initializing the LNS database

When CARE exports the LNS Network it does so in an OFF-NET mode, and all devices have their state set to Offline. It is necessary to initialize the LNS database each time the CARE LNS Network is exported.



Note

The computer must be physically connected and communicating on the LON Network to perform this task.

To initialize the LNS database:

- 1 In the Honeywell Cbus Configuration tool select the LON cbus you are configuring and ensure the correct LNS database and the LON driver is entered.
- 2 Click **Initialize** and follow the prompts.

Configuring C-Buses



Note

This topic is applicable only if you have an EBI system.

You use the Honeywell C-Bus Configuration Tool to configure c-buses and EXCEL 5000 via LON.



Note

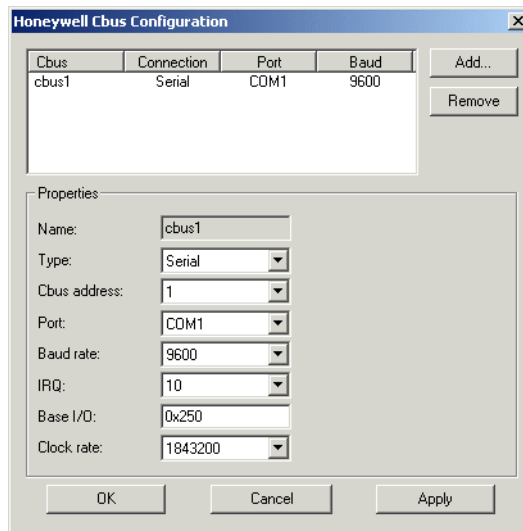
- You must use this tool to define a C-Bus before configuring the EXCEL 5000 point server or defining an EXCEL 5000 channel in Quick Builder.
- You must restart the computer when you have configured (or make changes to) the c-buses, so that the changes take effect.

Use this tool on all remote point servers or Networked XLNET Nodes as well. If all C-Bus connections in the system are via remote point servers or Networked XLNET Nodes, you do not need to use this tool on the server.

To configure c-buses:

- 1 Select **Start > Settings > Control Panel** and double-click the **C-bus** icon.

Figure 12 Configuration tool



- 2 Click the **Add** button to add new c-busses. The configuration of each C-Bus will vary depending on the connection type.

To configure a each connection, specify the following values:

Property	Description
Name	The name of the C-Bus connection.
Type	The connection type. Either: <ul style="list-style-type: none"> • Serial • XPC500 • BNA • Dialup (only available when a minimum of one XPC500 c-busses is defined) • LON
Cbus address	The address (id) of the server on the C-Bus.
Port	(Only applicable to Serial, XPC500, BNA and Dialup) Serial: Port is the COM port used. For example, COM1 or COM2. XPC500: Port is the actual XPC card used. For example, xpc1 or xpc2. BNA: Port is the port on the BNA where the C-Bus is connected. Dialup: Port is the configured XPC500 C-Bus used for this dialup connection. For example xpc1 or xpc2.
Baud rate	(Only applicable to Serial, XPC500, BNA and Dialup) The number of data bits per second.
Board Type	(Only applicable to XPC500) ISA: XPC500 card is an ISA card PCI: XPC500 card is a PCI card
IRQ	(Only applicable to Serial and XPC500 ISA) Serial: Enter the value specified in the Windows 2000 Device Manager. (See “Communications settings for serial C-Bus” on page 33.) XPC500 ISA: Enter the value used when setting the IRQ jumper on the XPC500 card. (See “XPC500 ISA card settings” on page 31.)

Property	Description
Base I/O	<p>(Only applicable to Serial and XPC500 ISA)</p> <p>Serial: Enter the value specified in the Windows 2000 Device Manager. (See “Communications settings for serial C-Bus” on page 33.)</p> <p>XPC500 ISA: Enter the value used when setting up the I/O port address switches on the XPC500 card. (See “XPC500 ISA card settings” on page 31.)</p>
Clock rate	<p>(Only applicable to Serial)</p> <p>The default is 1843200.</p>
IP address	<p>(Only applicable to BNA)</p> <p>Enter the IP address of the BNA as specified when setting up the BNA. (See “Specifying the IP address and loading the firmware” on page 36.)</p> <p>If you have an existing network, this will be provided by your network administrator. Otherwise, specify something like 200.0.0.x, where x is a unique number for each network adapter (and usually each host) on the network. This number can be between 1 and 254.</p>
Dialup Port	<p>(Only applicable to Dialup)</p> <p>The port on the XPC500 card where the modem is connected.</p> <p>Each XPC500 modem port to be used for dial-up purposes must be defined.</p> <p>When configuring a C-Bus for dial-up connection, define the XPC500 C-Bus before the dialup C-Bus, even if there is no XPC500 C-Bus connected.</p>
Database	<p>(Only applicable to LON)</p> <p>Select the name of the LNS database.</p>
Driver	<p>(Only applicable to LON)</p> <p>Select the LonWorks Interface device driver.</p>
Virtual Bus ID	<p>(Only applicable to LON)</p> <p>Used when connecting several separate logical busses to the same physical LON network and LNS database. Enter the value which is configured as the “LON Bus ID” on the controller.</p>

- 3 Click the **Apply** button when you have defined all the c-busses.
- 4 Restart the computer so that the changes take effect.

If you have:	Then:
EXCEL 5000 Direct Interface	You can now configure the EXCEL 5000 Direct Interface. See “EXCEL 5000 Direct Interface setup” on page 47.
EXCEL 5000 Scan Task Interface	You can now configure the EXCEL 5000 channels, controllers and points in Quick Builder. See “EXCEL 5000 Scan Task controller configuration and addressing” on page 77.

EXCEL 5000 Direct Interface setup

3

This chapter explains how to set up the EXCEL 5000 Direct Interface. It assumes that you have already installed the EXCEL 5000 point server software and have connected and configured the C-Bus.



Attention

The EXCEL 5000 Direct Interface is applicable to EBI only.

The following table lists the steps for connecting and configuring an EXCEL 5000 Direct Interface. Complete each step before commencing the next step.

Step:	Go to:
Define an EXCEL 5000 point server on the Honeywell server	page 48
Configure EXCEL 5000 Direct controllers	page 50
Discover (or configure using Quick Builder) points	page 52

Defining an EXCEL 5000 point server

You need to define an EXCEL 5000 point server in Station so that the Honeywell server can communicate with EXCEL 5000 controllers. You may also need to configure connection details for the interface using the EXCEL 5000 Direct configuration tool.

Pre-requisites

- You must be logged onto Station with mngr privileges.
- The EXCEL 5000 Direct service must be started.

To define the point server in Station:

- 1 Click the **Point Servers** icon on the **System Configuration Menu** to call up the Point Servers display.
- 2 Click an empty record to call up the Configuration tab of the Point Server detail display.
- 3 Select **EXCEL 5000** as the Point Server Type and click **Configure**.
- 4 Configure the point server properties as appropriate.
- 5 Click **Area Assignment** to call up the Areas display.
- 6 Specify the Area and Description for each area used by the point server. In each case, select EXCEL 5000 from the Server list. The Honeywell server should start communicating with the point server.
- 7 Return to previous display (showing the configuration details for the point server) and click the Status tab to check that point server is communicating with the Honeywell server.



Note

It may take some time—up to 30 seconds—before it is apparent that communication has been established. If communications are not established after this time, further configuration may be required using the EXCEL 5000 Direct configuration tool.


Property	Description
Point Server Type	Select EXCEL 5000
Network Name	The TCP/IP name of the computer on which the EXCEL 5000 point server resides.
Alias	The actual name of the point server.

Property	Description
Abbreviation	The abbreviation that appears in alarm and event listings.
Architecture	Select the checkbox if the point server is connected via a dual network.

Considerations

- The alias for the point server must be entered exactly the same as the alias defined for the point server in Station.
- The Alias is case-sensitive.

To define the point server using the EXCEL 5000 Direct configuration tool:

- 1 On the computer that has the EXCEL 5000 point server configured, double-click the EXCEL 5000 Direct configuration tool icon  in the status area.
- 2 Click the Service tab.
- 3 In the Server Name field, enter the network name as defined for the point server in Station.
- 4 In the Alias field, enter the Alias as defined for the point server in Station.
- 5 Restart the EXCEL 5000 Direct service as described in “Stopping and starting the EXCEL 5000 Direct service” on page 59.

Configuring controllers


Discovering controllers online

After you have defined an EXCEL 5000 point server and connected it to a bus, controllers that are connected and online are automatically discovered and built using their controller name. These controllers can now be uploaded into Quick Builder, to be used when importing or uploading your points. (CARE import and Quick Builder upload require controllers to be defined before points are created.)

Manually defining an EXCEL 5000 Direct controller

If you are configuring your system offline, you can define controllers manually to describe each physical controller.

To define a controller using Quick Builder:

- 1 Click  to add a controller.
- 2 In the Add Items dialog box, select Controller as the item and EXCEL 5000 Direct as the controller type.
- 3 Enter the property definitions for the controller on the controller Main property page.

EXCEL 5000 Direct controller Main properties

Use the Main tab to define the basic properties for an EXCEL 5000 controller.

Property	Description
Name	The unique name of the controller. A maximum of 10 alphanumeric characters (no spaces or double quotes).
Description	A description for this controller. A maximum of 132 characters, including spaces, can be entered.
Point Server Alias	The name of the point server that this controller is connected to. For more information see “Defining an EXCEL 5000 point server” on page 48. The alias is case-sensitive and must be the same case as the alias entered in Station and the EXCEL 5000 Direct configuration tool.

Property	Description
Bus Number	The bus number that this controller represents. This number is defined when using the C-bus Configuration tool to define c-busses and EXCEL 5000 via LON. For example, if you defined C-Bus 1 using the C-bus Configuration tool, you would enter the number 1 here, C-Bus 2 would be the number 2, and so on.
Address ID	The unique address ID number of the EXCEL 5000 controller. It must be a number between 01 and 30 and be a unique ID on the channel (C-Bus). For more information on controller address IDs see “Controller address ID” on page 84.

Configuring points

Discovering points online

Once you have defined an EXCEL 5000 point server and connected it up to a C-Bus you can discover points without any further configuration using Station.

To discover a point online using Station:

- 1 Using the command zone of Station, type in the case-sensitive name of the user address of the point in a connected controller.
- 2 Press F12 or <Detail> to request the system to search for the point
- 3 The system will then ask the EXCEL 5000 point server to search for the point on all connected controllers.
- 4 If a point with the specified user address exists on a connected controller, a point will be created using the user address as its name.

The discovery process is performed when building a custom display using Display Builder, assigning a point to a trend using the Trend Configuration Page, assigning a point to history using the History Assignment page etc.



Note

Only explicit point names that exactly match the user address can be used to discover points online. If you wish to use arbitrary point names you will need to use Quick Builder.

Importing points using Quick Builder

When you are working on a larger project it may be more convenient to import and manage the set of EXCEL 5000 points using Quick Builder. This tool provides an easy way to set the Area or other properties of a set of points quickly.

Defining EXCEL 5000 points

- 1 Use CARE to generate an output file from the controller data. See “Producing a CARE output file” on page 53.
- 2 In Quick Builder use the CARE Import Wizard to read the output file generated by CARE.
- 3 Complete the point definitions in Quick Builder and download to the server.
- 4 Use Station to modify point details where necessary.

Producing a CARE output file

Two types of CARE output files can be used to convert controller points defined with CARE into points in the Quick Builder database:

- **Long Format Description File**
Use the data point editor in CARE to run a Long Format Description and print to file. Save the file with a .rpt extension.
Problems have been encountered if the CARE print to file operation is directed to a diskette. Create the description file on the hard drive first and then copy it to a diskette for transfer.
- **CARE Print Out Tool**
Use this tool to save controller point information to a Rich Text Format file. Save the file with a .rtf extension.

Importing point definitions into Quick Builder

When you have created a CARE output file, you need to run Quick Builder's CARE Import Wizard to import the point data into a Quick Builder project.


To import a CARE project:

- 1 Select **Tools > QB CARE Import Wizard** to start the wizard.
The wizard's operation is self-explanatory, and takes you step-by-step through the import options.

Manually building points using Quick Builder

When you want to add points manually using Quick Builder you need to define a point for each point in the controller.

To define a point using Quick Builder:

- 1 Click  to add a point.
- 2 In the Add Items dialog box, select **Point** as the item and **EXCEL 5000 Direct Point** as the point type.
- 3 Enter the point details on the Main property page for the point. For help with the point definitions, see "EXCEL 5000 Direct point Main properties" on page 54.

- 4 If required, modify any display, scripting or user defined parameter properties for the point using the Display, Scripts and User Defined property pages.
- 5 You can also assign Fast, Standard or Extended History to the PointValue (analog type points) and PointState (digital type points) parameters using the History property page.

EXCEL 5000 Direct point Main properties

Property	Description
Point ID	A unique name for the point. It can contain up to 40 alphanumeric characters, with at least one alpha character.
Description	A description of the point that helps identify it. The description often appears in Station displays. It can contain up to 132 characters maximum, including spaces.
Area Code	The area to which the point belongs.
Controller	The name of the controller on which the point resides. You need to have defined the controller in order for its name to appear in the list.
Point Type	The type of the point in the EXCEL 5000 controller. This is determined in CARE when creating the point.
User Address	The user address of the point in the EXCEL 5000 controller. This is determined in CARE when creating the point. The user address is case-sensitive.
Control Confirmation	If you configure the point for electronic signature, the server only executes the control after the operator(s) has entered a password(s). For details, see Quick Builder's help. If you do not configure the point for electronic signature, the operators are prompted to confirm the control (Yes or No)—the server only executes the control if the answer Yes.
BACnet Point Type	The type of BACnet object that this point represents. You need to define this only when the EXCEL 5000 point is required to be available as a BACnet server point.

**Note**

The definition of EXCEL 5000 Direct points does not require any specific address location syntax (except user address) as the point represents all parameters of the EXCEL 5000 point in the controller.

Downloading and uploading points using Quick Builder

Points that have been imported or manually created in Quick Builder need to be downloaded to the Honeywell server before an operator can use them.

To download points:

- 1 Select **Tools > Download**.
- 2 Select the scope of points to download.
- 3 If you are only downloading EXCEL 5000 points there is no need to rebuild the scan tables. Deselect Rebuild Scan Tables to shorten the time to download.
- 4 Click **OK**.

You can manage points that have been discovered online as well. To do this you will need to upload all the points from the Honeywell server database into the Quick Builder project.

To upload points:

- 1 Select **Tools > Upload**.
- 2 Select the scope of points to upload.
- 3 Click **OK**.

Deleting and renaming points

To delete a point that has been discovered online you will need to upload the points into Quick Builder, use Quick Builder to delete the point and then download the deletion.

To delete a point that has been imported or manually created in Quick Builder you will need to delete the point in Quick Builder and then download the deletion.

To rename a point that has been discovered online you will need to upload the point into Quick Builder, use Quick Builder to rename the point and then download the new point.

EXCEL 5000 Direct point parameters

The EXCEL 5000 Direct Interface supports the following EXCEL 5000 point parameters. See the CARE documentation to determine which parameters each point type supports. Earlier versions of operating systems may not support all of these parameters, check the CARE documentation for supported versions.

Parameter	Description
Name	User Address (18 characters)
PointValue	Current value (for analog)
PointState	Current State (for Digital)
PV	Maps to CurrentValue or CurrentState
AutoValue	Value of Point in control logic, disregards manual override
DeviceTechnicalAddress	The Technical Address is an internal 6 digit number that defines and locates a point in the system. Format is CCMMTT, where CC=Controller MM=module TT=terminal
Description	Description of point
StateText	Current state text value of the point
StateText0	State text to use for State 0
StateText1	State text to use for State 1
Condition	Indicates the condition of the point. Normal = 0 In Alarm = 1 No Response = 2 In Alarm/Suppressed = 3 In Alarm/Manual = 4
EngineeringUnit	Engineering unit
ModeState	Current Mode (auto =0 manual =1 manual override = 3)
TrendHysteresis	Trend Hysteresis is the value that the point must change before software writes it to the trend buffer
TrendCycle	Trend Cycle is similar to the Trend Hysteresis value, but is based on time (minutes)
SuppressAlarm	Suppress Alarm indicates whether or not the controller should suppress alarm messages for changes in Fixed Mode and exceeding the alarm and warning limits
EnableAlarm	Indicates if the alarm is enabled
AlarmPriority	Indicates the priority of the alarm, critical or non-critical
AlarmHysteresis	Alarm Hysteresis is the amount that an analog point must change before controller reports an alarm or return-to-normal

Parameter	Description
AlarmDelay	Alarm Delay indicates how long an alarm condition must exist before controller generates an alarm (seconds)
HighLimit1	High Warning Limit
HighLimit2	High Alarm Limit
LowLimit1	Low Warning Limit
LowLimit2	Low Alarm Limit
SensorOffset	Sensor Offset value
TimeToOpen	Time required for the actuator of a three-position output to motor from the closed to the open state (seconds)
TimeToClose	Time required for the actuator of a three-position output to motor from the open to the closed state (seconds)
Characteristic	Input and output characteristic of the associated sensor
ActiveState	The Active State determines which point state (Logic 0 or 1) is the active (“normal”) state. The other state is the passive (“alarm”) state
RuntimeEnabled	Runtime Enabled sets whether or not to maintain a count of hours run
AccumulatedRuntime	Accumulated hours
ServiceInterval	The Service Interval is the number of log hours after which the controller generates a maintenance alarm
HoursSinceService	Accumulated hours since last service reset
NumberOfTransition	number of change of states
PulseDuration	The Pulse Duration Time of momentary pulse output (seconds)
FeedbackDelay	Feedback Delay Time is the length of time before software checks the input to verify that it follows the associated output (seconds)
NumberOfStages	Number of stages in this feedback point (1, 2, or 3)
DurationOff	Duration Off time is the value that the software uses in conjunction with switching point state (down) with a switch to off between states
DelaySwitchUp	Delay Switch Up is the waiting period between switching the stages of a staged point
DelaySwitchDown	Delay Switch Down is the waiting period between switching down the stages of a staged point
SwitchingDown	Switching Down is the sequence to use when switching down
ScalingFactor	Scaling Factor is the amount of measured unit per incoming transition

Parameter	Description
IntervalLimit	Interval Limit is the number of transitions for software to count before generating an alarm
IntervalValue	Current number of transitions
FlexPointClass	Class of Flex point


EXCEL 5000 device parameters

The EXCEL 5000 Direct Interface supports the following EXCEL 5000 device parameters:

Device	Description
ControllerName	Name of controller as defined in CARE
ProgramName	Name of program as defined in CARE
Status	Controller communication status
ControllerNumber	C-Bus ID
ControllerType	For example, XL500 or Zone Manager
FirmwareVersion	Operating System Version
ApplicationStatus	Indication if the application is running or stopped

Stopping and starting the EXCEL 5000 Direct service

To stop and start the service:

- 1 On the computer running the EXCEL 5000 point server, right-click the **EXCEL 5000 Configuration** tool icon  in the status area.
- 2 Select **Stop EXCEL 5000 Direct**. The icon changes to yellow while stopping, then a red square indicates the service has stopped.
- 3 Right-click the **EXCEL 5000 Direct Configuration** tool icon.
- 4 Select **Start EXCEL 5000 Direct**. The icon changes to yellow while starting and then a green arrow indicates the service has started.

Monitoring EXCEL 5000 Direct performance

EXCEL 5000 Direct performance can be monitored using the Windows Performance Tool.

The following performance objects can be monitored:

- EXCEL 5000 Direct—monitors total point server performance
- EXCEL 5000 Direct C-bus—monitors individual C-bus and controller performance.

To start monitoring EXCEL 5000 Direct performance:

- 1 On the computer running the EXCEL 5000 point server, select **Start > Settings > Control Panel**.
- 2 Double-click **Administrative Tools**.
- 3 Double-click **Performance** to open the Performance Console.
- 4 Click **Add** to add counters to the display.
- 5 Select the EXCEL 5000 Direct or the EXCEL 5000 Direct C-bus performance objects.

Configuring alarms

Alarm priority mapping

The alarm tab is used to configure the mapping of EXCEL 5000 controller based alarms to server alarms. EXCEL 5000 system and point alarms generated by the controllers have either a Critical or Non-Critical priority. These priorities need to be represented on the server as Urgent, High, Low or Journal alarms.

To configure the alarm priorities:

- 1 On the computer running the EXCEL 5000 point server, double-click the **EXCEL 5000 Direct Configuration** tool icon in the status area.
- 2 Click the Alarms tab.
- 3 Select the appropriate server alarm priorities for:
 - System alarms (Critical and Non-Critical priority)
 - Point alarms (Critical and Non-Critical priority)
- 4 Click **OK** to implement the priorities for future alarms.

Suppressing trivial alarms

You can also suppress Auto and Manual point alarms generated by the controllers when a point is changed from Auto to Manual or vice-versa.

To suppress alarms:

- 1 On the computer running the EXCEL 5000 point server, double-click the **EXCEL 5000 Direct Configuration** tool icon in the status area.
- 2 Click the Alarms tab.
- 3 Select the **Suppress trivial alarms** checkbox to suppress the alarms.
- 4 Click **OK** to implement the changes for future alarms

EXCEL 5000 Scan Task engineering guide

4

You need to read and understand this chapter before configuring EXCEL 5000 controllers using the EXCEL 5000 Scan Task.

For information about:	Go to:
Planning C-Bus Communications	page 64
Determine the architecture	
Installing a C-Bus for: <ul style="list-style-type: none">• XPC500, Serial and BNA Connections• LON Connections	
Using CARE with your system	page 69

Planning C-Bus communications

The aim of this guide is to provide planning, implementation and tuning information to enable efficient and high performance C-Bus communications between field controllers and the server when using the EXCEL 5000 scan task.

When configuring EXCEL 5000 controllers and points, it is essential that the limitations of C-Bus communications and the nature of exception reporting is acknowledged and clearly understood.

It is important to plan and implement the system with this in mind at every stage. From planning the number of points or controllers on a C-Bus, to controller configuration with CARE, and to building points on the server, the effect on C-Bus communications should always be considered to ensure an operable and efficient interface.

C-Bus traffic limits

The primary source of C-Bus traffic is point value exception reports.

Each time a point in the controller that has its refresh flag set changes value, a report is sent onto the C-Bus to be read by the server.

The server requests the refresh flag to be set on all points configured in the server database. The more points there are and the more often these points change value, the more reports that will be generated and placed on to the C-Bus.

The following table lists the maximum and service report rate limits for different C-Bus configurations and baud rates. The maximum limit is the maximum throughput capacity of the C-Bus. Attempting to place more messages on the C-Bus above this limit will result in some messages being lost from the C-Bus. The service limit is the recommended limit, which leaves enough spare bandwidth for configuration and schedule access and some point scanning.

Table 7 C-Bus load limits

C-Bus Connection	Baud Rate	Maximum Limit (Reports/Min)	Service Limit (Reports/Min)	Service Limit (Reports/Sec)
XPC 500/BNA	9600	500	500	8
XPC 500/BNA	76800	2700	2500	40
Serial	9600	500	500	8

The traffic on a C-Bus channel can be measured using the EXCEL 5000 Traffic Utility. For more information see “Monitoring C-Bus exception report traffic” on page 99.

C-Bus traffic sources

EXCEL 5000 points automatically report their value on the C-Bus according to the following rules:

- For zone managers and controllers with firmware pre v1.05:
 - Status points report with each change of state
 - Analog points with value < 10 report with a change > 0.1
 - Analog points with value > 10 report with a change > 1%
- For controllers with firmware v1.05 and above:
 - Status points report with each change of state
 - Analog points report with a change > Trend Hysteresis Value

Some points change value more often than others and therefore contribute more to C-Bus traffic. The rate at which a point reports on the C-Bus determines its activity rate.

The following table lists typical HVAC input points into activity rates. These are the point types to be aware of when planning C-Bus traffic loading. Special attention must be given to high-activity point types because these points will be the source of most C-Bus traffic.

Table 8 Typical activity rates

Activity Rate	Reports/Minute	Typical Types of Point
High Activity	>10	<ul style="list-style-type: none"> • Air Flow • Duct Air Static Pressure • Chilled and Hot Water Temperatures
Medium Activity	4-10	<ul style="list-style-type: none"> • Chilled Water and Heated Water Valve Control • Damper Controls • Equipment Amps
Low Activity	<4	<ul style="list-style-type: none"> • Space Temperature • Setpoints

C-Bus traffic engineering approach

Most C-Bus traffic is caused by a relatively small number of high-activity points. To reduce the resultant traffic from these points requires that some engineering considerations be adopted.

The use of deliberate control strategies in CARE to limit the rate at which high-activity points report on the C-Bus greatly increases the number of allowable points per channel. Even if deliberate control strategies are not used, some minimum considerations must be adhered to. The considerations required by the two approaches are:

- Minimum Engineering:
 - Map totalizer points to pseudo-analog
 - Use trend hysteresis to reduce the amount of traffic produced by selected points
 - C-Bus tuning using the EXCEL 5000 Traffic Utility and PVPERIOD on selected points. For more information see “Tuning C-Bus traffic with the EXCEL 5000 traffic utility” on page 99.
- Advanced Engineering:
 - In addition to the minimum considerations listed above, an advanced engineering approach will also use CARE control strategies to limit the traffic caused by high-activity points. An example control strategy is described below.

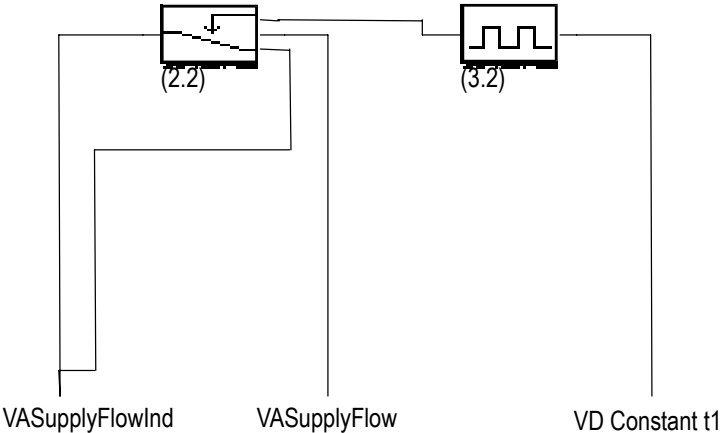
CARE control strategy example

The following control strategy is typical of an air-conditioning VAV plant. Supply air flow is a typical high-activity type point which, when used in large numbers, can cause excess C-Bus traffic.

The control strategy is used to limit the rate at which the flow value is updated to the server.

The analog input, SupplyFlow is not directly mapped to a server point. Instead, the pseudo-analog point, SupplyFlowInd is mapped to a server point. The Control Strategy used is shown in the following diagram.

Figure 13 Typical control strategy



The pseudo-analog point SupplyFlowInd is mapped to a server point. The update rate for the point is controlled by the pulse Icon. Set the on time parameter to a value less than the controller cycle time and the off time parameter to the update rate required, typically 30 to 60 seconds.

Thus a high-activity point which was capable of reporting ten or more times per minute will now report via a pseudo-analog only once or twice per minute.

This example control strategy can be easily cut and pasted in CARE to all high-activity points in the project. When points are built in the server they should be mapped to the pseudo point, rather than directly to the input point.

C-Bus maximum point counts for EXCEL 5000 Scan Task

The following table lists the maximum C-Bus point counts based on baud rate and engineering approach.

Table 9 C-Bus point count

Engineering Approach	Baud Rate	Max. High-activity Points per C-Bus	Max. Total Points per C-Bus
Minimum	9600	30	800
	76800	150	2000
Advanced	9600	100	1200
	76800	450	5000

The following table lists the recommended maximum number of points for a dial-up C-Bus.

Table 10 Dial-Up C-Bus point count

Modem Baud Rate	Max. Total Points for Dial-Up C-Bus
2400	100
9600	400

Understanding CARE and the EXCEL 5000 Scan Task

The following list provides an overview of the configuration aspects of the server and EXCEL 5000 controller configured with CARE when using the EXCEL 5000 Scan Task:

- Server points are uniquely identified by their Point Name.
- EXCEL 5000 controller points are uniquely identified in the controller by their User Address.
- A point must be built on your server using Quick Builder in order to be displayed or used in your system.
- Server points are mapped to the controller point via a reference to the EXCEL 5000 User Address.
- There is no mapping of the EXCEL 5000 point's technical address to the server point. If the EXCEL 5000 point's technical address changes, it will be automatically detected by the server.
- A conversion utility, Quick Builder CARE Import Wizard, creates points in a Quick Builder project file from a CARE PrintOut Tool file.
- Multiple EXCEL 5000 controller points can be combined if required, into a single server point.
- Where one EXCEL 5000 controller point is mapped to one server point, it is recommended that the Point Name and User Address for the points should be kept the same.
- Where more than one EXCEL 5000 point is mapped to one server point, the Point Name should be similar to the User Addressees used by the combined points. The CARE Import Wizard can automatically combine points with similar User Addresses and pre-defined suffixes.
- The server and CARE databases have different limitations and so special considerations are required when programming CARE.

Point types

The terminology for point types differs between CARE and your system, as indicated in the following table.

Table 11 EXCEL 5000 Points Mapping

CARE Point Type	Server Point Type	Comment
Digital Input	Status	Up to 8 states supported in server
Digital Output	Status	Up to 8 states supported in server (4 states for control)
Pseudo Digital	Status	Up to 8 states supported in server
Multi-State Digital	Analog/Status	“Multi-state digital mapping” on page 71
Analog Input	Analog	
Analog Output	Analog	
Pseudo-Analog	Analog	
Pseudo-Analog	Status	“Pseudo-analog mapping” on page 71
Totalizer	Analog	Mapped via pseudo-analog (see “Pseudo-analog mapping” on page 71) or direct and scanned with PV period
Flag Point	-	Not mapped
Global Point	-	Not mapped

Digital mapping

EXCEL 5000 digital points can have up to 16 states with controller firmware v1.05 and later and up to 7 states prior to this.

A server status points can have the following configuration:

- Up to eight states for display (PV Parameter)
- Up to four states for control (OP Parameter)
- The server can command to states 0 to 3

Server status points mapped to EXCEL 5000 digital input points display according to voltage present at the input terminals.

- Voltage >5 volts Logic state = 1; Server status point state = 1
- Voltage <2 volts Logic state = 0; Server status point state = 0

Reversing the active/passive state or engineering unit in the CARE data point editor has no effect on the server displayed value. Changing the input normally open/normally closed state for the digital input point has no effect on the server displayed value. It is important to reduce rework to ensure digital states are correct in the EXCEL 5000 controller before building the server points.

Multi-state digital mapping

An EXCEL 5000 point with more than 8 states or multi-state digital point must be mapped to a server analog point. Set the 100% range parameter on the server point to the maximum state value. Set the number of decimal places for operator display to 0. Indicate the multiple states on a custom display using a shape sequence. (See the *Display Builder Guide*).

If a multi-state digital point is required to be controlled to a higher state value than 3, then it must also be mapped to a server analog point even if it has less than 8 states.

Pseudo-analog mapping

In nearly all cases, server analog points will be used to map to EXCEL 5000 pseudo-analog points. However, server status points can be mapped to an EXCEL 5000 pseudo-analog point if required using these guidelines:

- In CARE set the value of analog point using control strategy or switching logic to values 0 to 7 as required. Command values will set the pseudo-analog point to values 0 to 3.
- In CARE set analog point to have NO decimal places.
- Most commonly pseudo-analog points will be mapped to analog points in the server.

Totalizer point mapping

Do not map totalizer points directly to server points. When the refresh flag is set on an EXCEL 5000 totalizer point every input pulse results in an exception message to the server. This causes unnecessary traffic on the C-Bus and should not be done.

Map totalizer points via the pseudo-analog point in the EXCEL 5000 controller. Use a control strategy in CARE to write the value of the totalizer to the pseudo-analog point, and use a control strategy to limit the update rate of the pseudo-analog point.

The only relaxation to this rule is if a PVPERIOD is used on the server analog point that is mapped directly to the EXCEL 5000 Totalizer point. A PVPERIOD of 3600 seconds is recommended. See “Defining EXCEL 5000 Points” on page 85 for more information.

**Note**

An EXCEL 5000 totalizer can display up to 8 digits before rollover. The server will display up to 7 digits. Use a control strategy in CARE to ensure the totalizer value does not exceed 7 digits.

Point properties

Case sensitivity

Server point names are **NOT** case sensitive.

CARE User Addresses are case sensitive.

Ensure that User Addresses that are to be mapped to the server are unique without relying on character case.

Example

Server point name ‘Fan1’ on the server is the same as point name ‘FAN1’
User Address ‘Fan1’ in CARE is not the same as ‘FAN1’

Ensure the User Addresses are unique across the entire project. While this requirement is not strictly necessary, it must be adhered to if a one-to-one mapping of point name to User Address is used across the project.

Status point state descriptors

The server’s status point state descriptors are limited to 8 characters. CARE digital points state descriptors can be up to 18 characters. The Quick Builder CARE Import Wizard will truncate the digital point engineering units to 8 characters.

Ensure CARE digital state descriptors are limited to 8 characters or that truncated state descriptors are suitable.

If status point state descriptors greater than 8 characters are required on custom displays, configure user acronyms to be used on displays. (See the *Configuration Guide*.)

Analog point engineering units, range and drift dead band

The number of decimal places for an analog point is not transferred from CARE to the server. The decimal places for custom displays is configured when points are assigned to the displays.

The server 100% Range and 0% Range values are set according to the defaults in the Quick Builder CARE Import Wizard. You may need to manually edit these in Quick Builder, so that the values are more appropriate.

The drift deadband parameter should be set to 0% for server points built on EXCEL 5000 controllers.

Point description

Point descriptions in CARE are limited to a maximum of 256 descriptors in the description table.

Point descriptions in the server are an intrinsic component of each point and can be individually edited after conversion if required.

Alarms

EXCEL 5000 controllers can generate alarms based on point alarm limits, states and conditions. The server has its own alarm subsystem, and generates all point alarms shown in the alarm summary. Alarm conditions must be suppressed in the controller and defined in the server using Quick Builder.

After the Quick Builder CARE Import Wizard conversion, select the alarm states, limits and alarm priorities for each point in Quick Builder or online after points are downloaded.

Suppressing alarms in controllers

It is highly recommended to suppress all point alarming in the controllers. This should be done for the following reasons:

- The server already performs all necessary alarm functions
- Alarm messages from the controller use C-Bus bandwidth

The only situations where alarm suppression should not be used are:

- on input points where sensor fail alarms must be reported
- where customer requirements specify the ability to view alarm conditions in the controller
- when using remote (dial-up) controllers

Inhibiting alarms on the server

Alarms may be inhibited in the server by using algorithms. Control strategies may be used in the controller to complement the server algorithms as described below:

- In the server configure a status change alarm group inhibit algo 79 or a status change alarm area inhibit algo 80. (See the *Configuration Guide*.)

- Create a pseudo-digital point in CARE controlled by a control strategy or switching table that indicates the required alarm condition. Set the required alarm states and priority in Quick Builder after Quick Builder CARE Import Wizard conversion.

For delayed alarms from digital inputs configure the digital point in CARE data point editor as follows:

- Alarm Point = yes
- Suppress Alarm = yes
- Alarm Delay = (Delay Time Seconds)

Using this strategy will delay the point value change reported to the server by the alarm delay time.

Analog point alarm limits

The four alarm limits assigned in CARE data point editor are transferred to the server using Quick Builder CARE Import Wizard. See the *Configuration Guide* for the descriptions of the various alarm options for analog points.

These limits are always updated in the EXCEL 5000 controller when changed at the server.

If alarm limit upload is enabled for the channel, limits are updated in the controller when the point is put into scan, parameters are accessed or the channel or controller is put in service. See “Defining an EXCEL 5000 channel” on page 78.

Server Limit Type	EXCEL 5000 Limit Type
PV Hi High	High Alarm Limit
PV High	High Warning Limit
PV Low	Low Warning Limit
PV Lo Low	Low Alarm Limit



Note

Other analog point alarm limits available in the server, for example set point deviation, can not be mapped to the EXCEL 5000 controller.

Point hours run

The recommended method for performing hours run calculations is by using a server-based hours run algo attached to an analog point. If a server-based hours run algo is used, no configuration for this function is required in the controller. (See the *Configuration Guide*).

Another method to calculate hours run is to use the RIA icon in a control strategy to write the hours run value to a pseudo-analog point in the EXCEL 5000 controller.

Alternately, build an analog point in the server mapped to the runtime parameter using PVPERIOD of 3600 seconds. Only whole hours are displayed. See “Defining EXCEL 5000 Points” on page 85 for more information.

Point initialization order

Points on the server are initialized within the controller in the order they are initially downloaded from Quick Builder. Controllers with many points (>300) on a heavily loaded C-Bus may take several minutes to initialize all points.

First download the most critical points from Quick Builder that require quick initialization, and then download other points on the same controller.

Controller naming

Use controller names that identify their location or use. Controller names must be unique.

Build controllers in CARE with the same names to be configured in the server.

System messages from the EXCEL 5000 controllers are annunciated on the Alarm Summary display. These messages include the controller names as configured in CARE. Consistent controller naming will assist fault diagnosis.

EXCEL 5000 Scan Task controller configuration and addressing

5

This chapter is applicable for connecting EXCEL 5000 controllers via the EXCEL 5000 Scan Task only. If you are using the EXCEL 5000 Direct interface, see “EXCEL 5000 Direct Interface setup” on page 47.

This chapter describes how to configure an EXCEL 5000 controller for your system using Quick Builder. For each configuration procedure, there is detailed information covering all supported EXCEL 5000 devices.


The Quick Builder controller configuration tasks are as follows:

For:	Go to:
Steps for defining an EXCEL 5000 channel	page 78
Steps for defining an EXCEL 5000 controller	page 83
Defining points	page 85

Defining an EXCEL 5000 channel

You need to define a channel for the LAN connection the server uses to communicate with the EXCEL 5000 controllers.

To define a channel using Quick Builder:

- 1 Click  to add a channel.
- 2 In the Add Items dialog box, select channel as the item and EXCEL 5000 as the channel type.
- 3 Enter the channel details on the Main property page for the channel. For help with the channel definitions, see EXCEL 5000 channel main properties.
- 4 To complete the channel definition, click the Port tab and define a port. See “EXCEL 5000 port properties” on page 80.

To define a redundant channel (BNA only):

- 1 Click the Redundant Port tab.
- 2 Select RedundantLANVendor as the Port type.
- 3 Specify the port name. See “EXCEL 5000 redundant port properties” on page 82.

EXCEL 5000 channel main properties

Use the Main tab to enter the basic channel properties for an EXCEL 5000 channel.

Property	Description
Name	The unique name of the channel. A maximum of 10 alphanumeric characters (no spaces or double quotes).
Description (optional)	A description of the channel. A maximum of 132 characters, including spaces.

Property	Description
Marginal Alarm Limit	<p>Communications alarm marginal limit at which the channel is declared to be marginal. When this limit is reached, a high priority alarm is generated. A channel barometer monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer increments by 2 or more, depending on the error and decrements for each good call.</p> <p>Type a new value in this field if you do not want the default, 25.</p>
Fail Alarm Limit	<p>Communications alarm fail limit at which the channel is declared to have failed. When this limit is reached, an urgent alarm is generated. A channel barometer monitors the total number of requests and the number of times the controller did not respond or response was incorrect. The barometer increments by 2 or more, depending on the error and decrements for each good call.</p> <p>Type a new value in this field if you do not want the default, 50.</p> <p>To compute an acceptable limit, double the Marginal Alarm Limit specified.</p>
Response Time	<p>The maximum amount of time, in seconds, that the server will wait, after issuing a control, for a response from the controller if you do not want the default, 10. If there is no response within the specified time, the server raises an alarm. For example, an OP Fail alarm would be raised on a point when an OP is being controlled and there is no response within the specified time.</p> <p>For controls for Dial-Up channels, you need to work out the time-out value depending on how many points exist on the channel and the number of points in trend. The following formula is intended as a guide. Note that the dial time is usually about 35 to 40 seconds.</p> <p>Response Time = dial time + number of points on channel</p>
Alarm Limit Upload	<p>Select if you want alarm limits to be read from the controller and not from the Quick Builder project file definitions for alarms.</p> <p>If alarm limits are changed via the point detail display in Station they will be written to the controller. If Alarm Limit Upload is selected, then any changes made to alarm limits in the controller will be written to the server the next time the point is synchronized.</p>

Property	Description
Item Type	Shows the type of item specified when this item was created.
Last Modified	Shows the date of the most recent modification to this channel's property details.
Last Downloaded	This shows the date that the item was last downloaded to the server.
Item Number	The unique item number currently assigned to this item by Quick Builder. You can change the item number displayed in this field if you need to match your current server database configuration. The item number must be between 1 and the maximum number of channels allowed for your system.

EXCEL 5000 port properties

The Port tab defines the communication-related properties for a channel. The **Port Type** for EXCEL 5000 must be LANVendor. (A proprietary communications link that is not a serial link.) The port name description must match the settings on the communicating devices. See “LANVendor port properties” on page 81.



Note

LANVendor port must be used even for a Serial C-Bus.

LANVendor port properties

Property	Description
Port Name	<p>There are two types of connections: Direct and Remote.</p> <p>Direct C-Bus Connection. Enter the host name and C-Bus number.</p> <p>The format is:</p> <p style="padding-left: 40px;"><i>HostName: CBusNo</i></p> <p>where:</p> <ul style="list-style-type: none"> • <i>HostName</i> is the TCP/IP name of the server in which the XPC500 card is installed, or to which the BNA is logically attached. Enter <code>localhost</code> unless you are using a Networked XLNET Node, in which case you enter the hostname of the remote computer. The hostname of the Networked XLNET Node must be defined in the server's TCP/IP hosts file. • <i>CBUSNO</i> is the number of the C-Bus on the computer as defined by the C-Bus Configuration Tool (cbus1 for the first C-Bus, cbus2 for the second, cbus3 for the third etc.). For example: <pre>localhost:cbus1 node2:cbus3</pre> <p>Remote (Dial-Up) C-Bus Connection. (Only applicable to an EBI system) Type dialup: and the server will automatically select a modem from the modem pool when it is time to connect. Do not enter the C-Bus number for a Dial-up channel.</p>

Test network connectivity to Networked XLNET Nodes or BNAs by using the **ping** command from a command prompt on the server.

EXCEL 5000 redundant port properties



Attention

This is applicable to BNA only.


The Redundant Port tab defines the communication-related properties for a redundant channel. The port type for EXCEL 5000 must be Redundant LANVendor. The redundant port name must use the same naming convention as the port name, however the redundant port name must not be the same as the port name.

See “LANVendor port properties” on page 81 for the naming conventions.

Defining an EXCEL 5000 controller

You need to define a controller to describe each physical controller on a channel.

To define a controller using Quick Builder:

- 1 Click  to add a controller.
- 2 In the Add Items dialog box, select Controller as the item and EXCEL 5000 as the controller type.
- 3 Enter the property definitions for the controller on the controller Main property page.

EXCEL 5000 controller main properties

Use the Main tab to define the basic properties for an EXCEL 5000 controller.

Property	Description
Name	The unique name of the controller. A maximum of 10 alphanumeric characters (no spaces or double quotes).
Description	(Optional) A meaningful description for this controller. A maximum of 30 characters, including spaces, can be entered.
Channel Name	The name of the channel on which the controller communicates. You need to have defined the channel in order for it's name to appear in the list.
Marginal Alarm Limit	<p>The communications alarm marginal limit at which the controller is declared to be marginal. When this value is reached, a high priority alarm is generated. This limit applies to the controller barometer which monitors the total number of requests to the controller and the number of times the controller did not respond or response was incorrect. The barometer increments by 2 or more, depending on the error and decrements for each good call.</p> <p>Type a new value in this field if you do not want the default, 25.</p>
Fail Alarm Limit	<p>The communications alarm fail limit at which the controller is declared to have failed. When this value is reached, an urgent alarm is generated.</p> <p>Type a new value in this field if you do not want the default, 50. To determine an acceptable limit, double the marginal alarm limit value specified.</p>

Property	Description
Address ID	The unique address ID number of the EXCEL 5000 controller. It must be a number between 02 and 30 and be a unique ID on the channel (C-Bus). For more information on controller address IDs see “Controller address ID” on page 84.
Dialup Report by Exception	(Only applicable to Dial-Up Controller) If this controller has an EXCEL 5000 Dial-Up channel, you can check this box if you want the controller to report by exception. By default, report by exception is disabled for Dial-Up channels.
Item Type	Shows the type of item specified when this item was created.
Last Modified	Shows the date of the most recent modification to this channel’s property details.
Last Downloaded	This shows the date that the item was last downloaded to the server.
Item Number	The unique item number currently assigned to this item by Quick Builder. You can change the item number displayed in this field if you need to match your current server database configuration. The number must be between 1 and the maximum number of controllers allowed for your system.

Controller address ID

Each EXCEL 5000 controller must have a unique ID on the C-Bus, between 2 and 30 inclusive. Do not use 1 because this number is usually reserved for the server, which also requires an ID (C-Bus address) in order to be identified by the controllers on the C-Bus.

If you have an EBI system, note that the XM100A and XDM506 devices do not need to be configured in Quick Builder. However, these devices are part of the C-Bus and therefore unique IDs must also be reserved for them. The configuration of these devices is done on line after all dial-up channels and controllers are defined. For more information see the *Building Management Guide*.

Defining EXCEL 5000 Points

- 1 Use CARE to generate an output file from the controller data. See “Producing a CARE output file” on page 85.
- 2 In Quick Builder use the CARE Import Wizard to read the output file generated by CARE.
- 3 Complete the point definitions in Quick Builder and download to the server.
- 4 Use Station to modify point details where necessary.

Producing a CARE output file

Two types of CARE output files can be used to convert controller points defined with CARE into points in the Quick Builder database:

- Long Format Description File
Use the data point editor in CARE to run a Long Format Description and print to file. Save the file with a .rpt extension.
Problems have been encountered if the CARE print to file operation is directed to a diskette. Create the description file on the hard drive first and then copy it to a diskette for transfer.
- CARE Print Out Tool
Use this tool to save controller point information to a Rich Text Format file. Save the file with a .rtf extension.

Importing point definitions into Quick Builder

When you have created a CARE output file, you need to run Quick Builder’s CARE Import Wizard to import the point data into a Quick Builder project.

To import a CARE project:


- 1 Select **Tools > QB CARE Import Wizard** to start the wizard.
The wizard’s operation is self-explanatory, and takes you step-by-step through the import options.

Entering an address

Initially, PV and other point source addresses are defined by the CARE Import Wizard. To define additional source or destination addresses using Quick Builder after importing the CARE file, the format for an EXCEL 5000 controller address is:

ControllerName Location

Part	Description
<i>ControllerName</i>	The name of the controller. You need to have defined the controller for the name to appear in this list.
<i>Location</i>	The location in the controller where the value is recorded. See “Location syntax” on page 86.

If you would like help when defining an address, click  next to **Address** to display Address Builder. For details, see the help.

Location syntax

Address Item

Part	Description
<i>Address</i>	The User Address of the point in the EXCEL 5000 controller (up to 18 characters).
<i>Item</i>	The point attribute to be scanned in the controller—see “EXCEL 5000 item definitions” on page 86.

EXCEL 5000 item definitions

Item	Description
VALUE	Point Value (use for normal scanning/control)
MODE	Operating Mode
ALARMDelay	Alarm Delay Time
AUTOVALUE	Point Initialization Value
LOWLIMIT1	Min Alarm Limit 1
LOWLIMIT2	Min Alarm Limit 2
HIGHLIMIT1	Max Alarm Limit 1
HIGHLIMIT2	Max Alarm Limit 2

Item	Description
RUNTIME	Runtime in hours
SERVICEINTERVAL	Service interval in hours
TIMESINCESERVICE	Time since last service in hours
<i>nnn</i>	Any other attribute, enter the attribute number. See “Point attribute numbers” on page 87 for a full list of controller point attribute numbers.



Note

The system does not check that the point attribute scanned is appropriate for the EXCEL 5000 point type. Many of the point attributes listed cannot be scanned into server points.

Information such as RACL Parameters and RACL Z-registers in the controller can be accessed using the Controller Configuration Summary display for the controller. See the *Configuration Guide* for your server for information about calling up the Controller Configuration Summary display.

Point attribute numbers

Only point attributes that have floating point values can be scanned into server point parameters.

Number	Point Attribute	Number	Point Attribute
00	point value	26	input characteristic
01	point value with engineering units	27	delta counter value
02	high limit 1	28	last counter value
03	low limit 1	29	interval limit
04	alarm delay time	30	scaling factor
05	ADC offset	31	password level
07	high limit 2	32	number of transitions
08	low limit 2	34	technical address
11	input type of feedback points	35	actuator closed time
12	accumulated run time	38	access priority
13	override priority	49	manual mode
14	output type of assigned points	50	alarm disable

Number	Point Attribute	Number	Point Attribute
15	binary attributes	51	in alarm
16	point initialization value	52	point enabled
17	service interval	53	remote point is on the slave
18	time of last change	56	enable trend
19	time since serviced	57	enable runtime
20	actuator open time	58	active state
21	point name	59	enable critical
22	point descriptor	60	alarm check enabled
23	point alarm text	63	point is in refresh
24	point units text		

Using scan periods with EXCEL 5000 points

Because EXCEL 5000 points report change of value by exception, you should generally disable scanning. Failure to do so can severely degrade system performance. (You disable scanning in Quick Builder by setting the **Scan Period** for all parameters (for example, PV, SP, OP, AI and so on) to 0.

Scanning may be appropriate in the following exceptions:

- Using Remote (Dial-up) controller.
Dial-up channels, by default, do not report on point parameters by exception. When a connection is initiated by the server to the remote dial-up channel, all point values are scanned. Additional background scanning of points can be set by defining a **PV Scan Period**.
Ensure that the scan periods are distributed evenly and there are not too many points on fast scan periods because this can seriously affect system performance. Note that scan periods will only be effective after the connection is established.
Occasionally it might be necessary to set points in a dial-up controller in “refresh”. Any changes to the point while the server is connected are reported by exception. This is done on a per-controller basis. To enable, select **Dialup Report by Exception** on the Main property page for defining the EXCEL 5000 controller. All points belonging to the controller will then be set for refresh. A dial-up channel can have up to 100 refresh points. Always set the **Scan Period** for all parameters to 0 if a point is set for refresh.
- Scanning Point attributes other than Value or Mode.
Only the value and mode attributes report changes from the controller by exception. In controller firmware v1.04 and earlier, only the value attribute reports by exception. All other attributes must be scanned if they are to be read into a server point parameters. For most attributes, a scan rate of 3600 seconds is appropriate.
- Scanning small numbers of high activity points.
If the EXCEL 5000 Traffic utility is used to identify a small number of high activity points, these points can be assigned a **Scan Period** to reduce the resultant C-Bus traffic. When a server point is assigned a **Scan Period**, it is no longer set in refresh.



Note

Do not scan more than 10 points per minute per channel. If scan periods are specified, try to reduce scanning load by using longer periods. The minimum allowable scan period for EXCEL 5000 points is 60 seconds. Do not scan more than 5% of all points on a channel.

Advanced EXCEL 5000 point configuration

Example point definitions

The following are examples of how to define the main server point parameters and the possible configuration to an EXCEL 5000 point.

Analog points

- Point will display the value of EXCEL 5000 point SpaceTemp
- Point is not commandable
- Point will not display the mode of EXCEL 5000 point SpaceTemp

Table 12 Analog points data

Server Point Parameter		EXCEL 5000 Point User Address	EXCEL 5000 Point Parameter
Tagname	SpaceTemp		
Description	Space Temperature		
PV Source Address		SpaceTemp	Value
SP Source Address			
SP Destination Address			
OP Source Address			
OP Destination Address			
MD Source Address			
MD Destination Address			

Display point with over-ride control

- Point PV will display the value of EXCEL 5000 point SpaceTemp.
- Point mode will display and control mode of EXCEL 5000 point SpaceTemp.
- Point SP can over-ride value of EXCEL 5000 point SpaceTemp when in manual mode.
- Point is not commandable.

Table 13 Display point data

Server Point Parameter		EXCEL 5000 Point User Address	EXCEL 5000 Point Parameter
Tagname	SpaceTemp		
Description	Space Temperature		
PV Source Address		SpaceTemp	Value
SP Source Address		SpaceTemp	Value
SP Destination Address		SpaceTemp	Value
OP Source Address			
OP Destination Address			
MD Source Address		SpaceTemp	Mode
MD Destination Address		SpaceTemp	Mode

Combined point with display value and setpoint adjustment

- The EXCEL 5000 Autovalue parameter is configured to the initialization value for the point in the EXCEL 5000 controller. Autovalue is typically used as a destination for commanding points that are not controlled by a control strategy or switching table in the EXCEL 5000 controller. Autovalue is not automatically updated when changed.
- Point PV will display the value of EXCEL 5000 point SpaceTemp.
- Point SP will display and control the value of EXCEL 5000 point SpaceTempSpt. SpaceTempSpt does not need to be in manual mode and can not be controlled from a control strategy or switching table in the EXCEL 5000 controller.
- Point is not commandable.

Table 14 Combined point data

Server Point Parameter		EXCEL 5000 Point User Address	EXCEL 5000 Point Parameter
Tagname	SpaceTemp		
Description	Space Temperature		
PV Source Address		SpaceTemp	Value
SP Source Address		SpaceTempSpt	Value
SP Destination Address		SpaceTempSpt	Autovalue
OP Source Address			

Table 14 Combined point data (continued)

Server Point Parameter		EXCEL 5000 Point User Address	EXCEL 5000 Point Parameter
OP Destination Address			
MD Source Address			
MD Destination Address			

Controlled point

- Point PV will display the value of EXCEL 5000 point ChwValve.
- Point OP will display and control the value of EXCEL 5000 point ChwValve.
- Point MD will display and control the Mode of EXCEL 5000 point ChwValve.
- Point is commandable from the server. The point must be set to manual mode before the required value is set via command to the point OP.

Table 15 Controlled point

Server Point Parameter		EXCEL 5000 Point User Address	EXCEL 5000 Point Parameter
Tagname	ChwValve		
Description	Chilled Water Valve Control		
PV Source Address		ChwValve	Value
SP Source Address			
SP Destination Address			
OP Source Address		ChwValve	Value
OP Destination Address		ChwValve	Value
MD Source Address		ChwValve	Mode
MD Destination Address		ChwValve	Mode

Combined point with setpoint adjust and output control

- The sample point combines EXCEL 5000 space temperature, space Setpoint and chilled water valve control points into a single server point.
- Point PV will display the value of EXCEL 5000 point SpaceTemp.
- Point SP will display and control the value of EXCEL 5000 point SpaceTempSpt.
- Point OP will display and control the value of EXCEL 5000 point ChwValve.

- Point MD will display and control the Mode of EXCEL 5000 point ChwValve.
- Point is commandable from the server.

Table 16 Combined point

Server Point Parameter		EXCEL 5000 Point User Address	EXCEL 5000 Point Parameter
Tagname	Space		
Description	Space Indication		
PV Source Address		SpaceTemp	Value
SP Source Address		SpaceTempSpt	Value
SP Destination Address		SpaceTempSpt	Autovalue
OP Source Address		ChwValve	Value
OP Destination Address		ChwValve	Value
MD Source Address		ChwValve	Mode
MD Destination Address		ChwValve	Mode

Status points

- Simple Display Point.
- Point PV will display the value of EXCEL 5000 point FanStatus.
- Point is not commandable from the server.
- Point will not display the auto/manual mode of EXCEL 5000 point.

Table 17 Status points

Server Point Parameter		EXCEL 5000 Point User Address	EXCEL 5000 Point Parameter
Tagname	FanStatus		
Description	Fan Status		
PV Source Address		FanStatus	Value
OP Source Address			
OP Destination Address			
MD Source Address			
MD Destination Address			

Analog point displaying hours run

- Point PV will display the value of Runtime Parameter of EXCEL 5000 point.
- PV Period must be used. Recommend 3600 seconds.
- Only whole hours are displayed.

Table 18 Analog points

Server Point Parameter		EXCEL 5000 Point User Address	EXCEL 5000 Point Parameter
ID	FanHoursRun		
Description	Fan Hours Run		
PV Source Address		FanStatus	Runtime

Display point with over-ride control from the server

- Point PV will display the value of EXCEL 5000 point FanStatus.
- Point OP will display and control the value of EXCEL 5000 point FanStatus.
- Point MD will display and control the Mode of EXCEL 5000 point FanStatus.
- Point is commandable from the server.

Table 19 Display point

Server Point Parameter		EXCEL 5000 Point User Address	EXCEL 5000 Point Parameter
Tagname	FanStatus		
Description	Fan Status		
PV Source Address		FanStatus	Value
OP Source Address		FanStatus	Value
OP Destination Address		FanStatus	Value
MD Source Address		FanStatus	Mode
MD Destination Address		FanStatus	Mode

Combined point with display and control

- Point PV will display the value of EXCEL 5000 point FanStatus.
- Point OP will display and control the value of EXCEL 5000 point FanControl.
- Point MD will display and control the Mode of EXCEL 5000 point FanControl.

- Point is commandable from the server. The server point must be in manual mode before commands to OP are accepted. Control of the EXCEL 5000 point from control strategies or switching tables is inhibited in manual mode.
- Point will not display the auto/manual mode of EXCEL 5000 point FanStatus.

Table 20 Combiner point with display and control

Server Point Parameter		EXCEL 5000 Point User Address	EXCEL 5000 Point Parameter
Tagname	Fan		
Description	Fan Status and Control		
PV Source Address		FanStatus	Value
OP Source Address		FanControl	Value
OP Destination Address		FanControl	Value
MD Source Address		FanControl	Mode
MD Destination Address		FanControl	Mode

Point with display and control

- Point PV will display the value of EXCEL 5000 point MasterSelect.
- Point OP will display and control the value of EXCEL 5000 point MasterSelect.
- Point is commandable from the server. The server point mode is not used. The EXCEL 5000 point can not be controlled from a control strategy or switching table in the EXCEL 5000 controller and must be in an auto mode.
- Point will not display the auto/manual mode of EXCEL 5000 point MasterSelect.

Table 21 Point with display and control

Server Point Parameter		EXCEL 5000 Point User Address	EXCEL 5000 Point Parameter
Tagname	MasterSelect		
Description	Master Select Point		
PV Source Address		MasterSelect	Value
OP Source Address		MasterSelect	Value
OP Destination Address		MasterSelect	Autovalue
MD Source Address			
MD Destination Address			

Server and Station tasks for EXCEL 5000

6

This chapter is applicable only to systems using the EXCEL 5000 scan task.

This chapter describes tasks for the EXCEL 5000 controller that you perform either on the server or from any Station.

For:	Go to:
Testing communications with the server	page 98
Troubleshooting communication errors	page 100

Testing communications with the server

Testing controller communications

Use the EXCEL 5000 diagnostic utility, **x15tst**, to test communications between the server and the EXCEL 5000 controllers after channel and controller definitions have been downloaded to the server. Note that this test utility will not work for dial-up channels



Caution

Do not run the utility while the channel is enabled. This will interfere with the scanning operation of the channel. Disable the channel first.

Before testing, complete the following:

- EXCEL 5000 interface set up including daemons and drivers
- All cables connected
- Channel and controller definitions downloaded from Quick Builder to the server without errors.

To run the utility:

- 1 In a Command Prompt window, type **x15tst** and press ENTER. You are prompted for a channel or LRN number (alternatively, select **Diagnostic Tools > EXCEL 5000 Test Utility**).
- 2 For channel number, type **CHNxx** where xx is the two digit channel item number.
- 3 Enter the function, such as **Find**, with the required parameters.

For help with the syntax or the functions, type **?** and press ENTER.

After communication is verified, points can be built using the CARE Import Wizard, and Quick Builder to reference EXCEL 5000 controller addresses.

For information about using the CARE import Wizard, see “Producing a CARE output file” on page 85.

Monitoring C-Bus exception report traffic

The EXCEL 5000 traffic utility is provided to monitor C-Bus traffic and identify high activity points by their User Address.

To run the utility:

- 1 In a command prompt window type **x1traffic** and press ENTER (alternatively, select **Diagnostic Tools > EXCEL 5000 Traffic Utility**)
- 2 Enter the channel number and monitor period. For a busy C-Bus, select a 5 second period.

Results of the analysis can be viewed on-line or dumped to a file.

Tuning C-Bus traffic with the EXCEL 5000 traffic utility

The EXCEL 5000 Traffic Utility can be used to significantly reduce C-Bus traffic after the installation and commissioning of a C-Bus. It is particularly useful for upgraded sites with existing C-Bus and controller installations.

If the results of a traffic analysis show that C-Bus traffic is at or above the recommended service limits (see “C-Bus traffic limits” on page 64) then use the following methodology to reduce C-Bus traffic.

- 1 Run the EXCEL 5000 traffic Utility to identify the top five most frequently reporting points.
- 2 Assess the importance of the field information associated with these points, and if appropriate assign a PVPERIOD of 60 or 120 seconds or longer to these points using Quick Builder (see “Using scan periods with EXCEL 5000 points” on page 89). Download the points to the server.
- 3 After the channel has finished synchronizing, repeat steps 1 and 2 until a satisfactory traffic load has been achieved (see “C-Bus traffic limits” on page 64) or 5% of points on the channel have PVPERIOD assigned.

This iterative approach must be used because some high activity points may be masking other points reporting on the bus. Generally Steps 1 and 2 should be repeated at least three times if the C-Bus traffic was exceeding limits.

Note the number of reports coming from each controller. If there are consistently more than 200 reports per minute from a controller on a 76.8kb C-Bus (120/minute for 9600 baud), the controller’s communication interface might be overloaded and traffic reduction strategies must be implemented.

Troubleshooting communication errors

If any errors are encountered, review the configuration settings and the channel and controller definitions in Quick Builder. Keep in mind the tips provided in “Installing a C-Bus for XPC500, serial and BNA connections” on page 18, “Using scan periods with EXCEL 5000 points” on page 89 and “Tuning C-Bus traffic with the EXCEL 5000 traffic utility” on page 99.

When the problem’s cause cannot be identified, contact your local Honeywell representative. They may advise you to perform a communications trace of the channel. For information on running a trace, see the *Configuration Guide* for your server.

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