



Where Automation Connects.



inRax[®]
PC56-HIST-xxxxLX

ControlLogix Platform
In-Rack PC with Data Historian

September 14, 2011

USER MANUAL

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PC56-HIST-xxxxLX User Manual

September 14, 2011

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PC56 Products

WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

AVERTISSEMENT - RISQUE D'EXPLOSION - AVANT DE DÉCONNECTER L'EQUIPMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DÉSIGNÉ NON DANGEREUX.

Warnings

ATEX Warnings and Conditions of Safe Usage

Power, Input, and Output (I/O) wiring must be in accordance with the authority having jurisdiction

- A** Warning - Explosion Hazard - When in hazardous locations, turn off power before replacing or wiring modules.
- B** Warning - Explosion Hazard - Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
- C** These products are intended to be mounted in an IP54 enclosure. The devices shall provide external means to prevent the rated voltage being exceeded by transient disturbances of more than 40%. This device must be used only with ATEX certified backplanes.
- D** DO NOT OPEN WHEN ENERGIZED.

PC56™ Battery Warning

PC56 CMOS BIOS settings are protected by a rechargeable battery during power-down situations. The battery must be fully charged before you change BIOS settings. You must keep the unit powered up for a full 20 hours in order to obtain full charge capacity. If the battery is not fully charged, changes to BIOS settings may be lost when the PC56 is removed from its power source. In this situation, the PC56 reverts to its default BIOS settings when power is re-applied.

If the battery is discharged, or the battery enable jumper is removed, the BAT LED will be illuminated red. A fully charged battery should maintain the BIOS settings for 15 days without power.

PC56 Markings

Electrical Ratings

- Backplane Current Load on PC56: 1 A @ 5 Vdc
- Backplane Current Load on IDE: 1 A @ 5 Vdc
- Operating Temperature: 0°C to 60°C (32°F to 140°F)
- Storage Temperature: -40°C to 85°C (-40°F to 185°F)
- Shock: 30 g Operational; 50 g non-operational; Vibration: 5 g from 10 Hz to 150 Hz
- Relative Humidity 5% to 95% (without condensation)
- All phase conductor sizes must be at least 1.3 mm(squared) and all earth ground conductors must be at least 4mm(squared).

Label Markings

II 3 G

Ex nA IIC X

0° C ≤ Ta ≤ 60° C

II - Equipment intended for above ground use (not for use in mines).

3 - Category 3 equipment, investigated for normal operation only.

G - Equipment protected against explosive gasses.

Agency Approvals and Certifications

CE	EMC-EN61326-1:2006; EN61000-6-4:2007
CSA	C22.2 No. 213-1987
CSA CB Certified	IEC61010
ATEX	EN60079-0 Category 3, Zone 2 EN60079-15



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1 Installing PC56-HIST

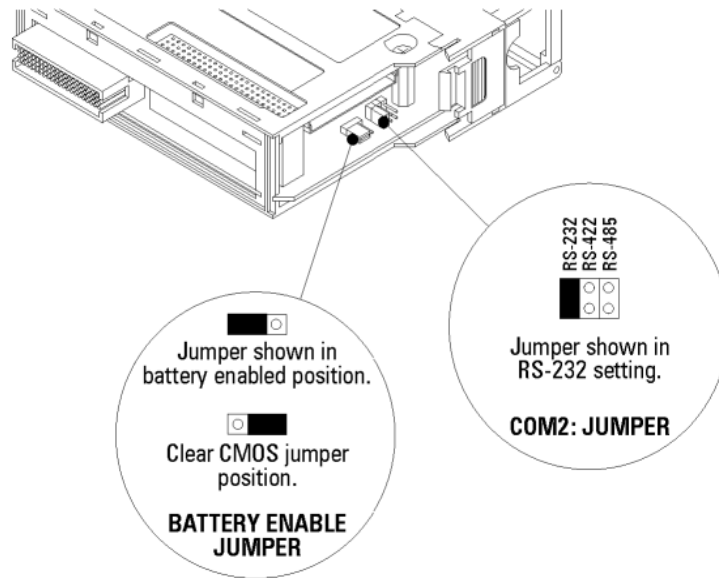
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1.1 Setting Jumpers

There are three jumpers to set, as your application requires.

1.1.1 Battery Enable/ CMOS Clear



Clearing CMOS Memory

Insert the jumper in the CMOS Clear position momentarily if you want to clear CMOS memory and restore the default BIOS settings.

1.1.2 Battery Enable

Place the jumper in the Battery Enable position to enable battery back-up of the system Real Time Clock, CMOS Memory, and 512 KByte battery-backed SRAM. If the PC56 is not going to be powered up for a long period of time, then it is advisable to remove the Battery Enable jumper to prevent complete discharge of the rechargeable battery.

1.1.3 COM1 Mode Select

Used to set COM1 serial port to one of the three configurations listed.

1.2 Inserting The Module

After you have checked the placement of the jumpers, insert PC56-HIST-xxxxLX into the ControlLogix[®] chassis. Use the same technique recommended by Rockwell Automation to remove and install ControlLogix[®] modules.

Align the module with the top and bottom guides and slide into the rack until the module is firmly against the back plane connector. With a firm but steady push snap the module into place. Check that the holding clips on the top and bottom of the module are securely in the locking holes of the rack.

Note: Improper insertion of the module can cause unpredictable system behavior.

Note: *If you are installing PC56-HIST-xxxxLX with other modules connected to the PCI bus. The peripheral modules will not have holding clips. Make sure all of the modules are aligned with their respective slots before you snap them into place.*

1.2.1 Turn ON power

The PC56 will go through a POST routine that will check RAM and when complete will set the OK LED to GREEN. All other LEDs will be blank or OFF, unless your application sets them.

1.3 Using the USB Ports

PC56 has two high speed Universal Serial Bus 2.0 (USB) ports for connection to a variety of USB devices. USB device drivers are normally provided by the USB device manufacturer.

2 Configuring PC56-HIST

In This Chapter

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2.1 Requirements

- PC56-HIST-xxxxLX
- Windows NT 4.0 SP6, Windows 2000 or Windows XP Professional
- At least 10 MB free disk space
- Microsoft Internet Explorer 5.01 or later
- Microsoft Excel 2000 or later (for Offline Configurator)

2.2 Definitions

PC56 Data Historian Object

PC56 Data Historian is the application on the PC56 device that captures and stores values in an archive. The application contains Historians, Data Files and Data Streams. The Interface sends the scanned ControlLogix or MicroLogix tag values to data streams in PC56 Data Historian

Data File

A Data File stores incoming data from a Data Stream. The number and size of data files affects the amount of history available. PC56 Data Historian maintains an individual data file for each Historian.

Data Stream

A Data Stream stores current ControlLogix tag values that are scanned and mapped by the PC56 to ECHO Interface and managed by a Historian.

Device

A Device is the local PC56 module or a ControlLogix or MicroLogix Controller.

Historian

A Historian manages historic data collected in Data Streams and stored in a Data File. You can use multiple Historians to logically organize data streams. Historians are configurable individually using parameters that apply to each of the Data Streams they manage.

Interface

The Interface is the "PC56 to ECHO Interface" Service, which scans configured tags and sends their values to data streams in ECHO.

Program

A program running on a ControlLogix or MicroLogix Controller.

2.3 PC56 Data Historian Overview

The Embedded Component Historian Object (ECHO) adds a scalable, robust, high-performance time-series data historian to hardware devices or software products.

The archive engine manages the historians and the reading and writing of historian data. A historian consists of one or more sets of time-stamped data values. These series of values are defined as data streams. For example, you can define a single data historian to manage all time-series data for all the sets of data (data streams) for a given production line, plus you can define other historians to handle other production lines.

2.3.1 ECHO Node Properties

Use the Offline Configurator (page 42) to set ECHO Node properties

Node Property	Description
Descriptor	This property is the string description of the CHNode. It may be both read and modified by the client application.
IDResolutionPluginIdleTimeout	This property allows the client application to specify how long the ECHO Archive Engine will allow the identity resolution plugin to be idle before it is destroyed.
LogCHHistorianManualFlushEvents	This property allows client applications to read or set a flag that controls logging of manual flush events for all CHHistorians.
LogCHHistorianPropertyModifyEvents	This property allows client applications to read or set a flag that controls logging of property modification events for all CHHistorians.
LogHistorianCreateEvents	This property allows client applications to read and set a flag indicating whether a log message should be written by the ECHO Archive Engine when new CHHistorians are created.
LogHistorianDeleteEvents	This property allows client applications to read and set a flag indicating whether a log message should be written by the Component Historian Archive Engine when existing CHHistorians are deleted.
LogPerfCounterResetEvents	This property allows client applications to read or set a flag that controls logging in the event that the performance counters are reset via the CHNode.ResetPerfCounters method.
LogPropertyModifyEvents	This property allows client applications to read or set a flag that controls logging in the event that one or more properties of the CHNode are modified.
LoggingEnabled	This property allows client applications to read or set a flag that specifies whether ECHO will log any events to the system logger. It acts as a master switch for all log messages. If set to false, nothing will be logged; if set to true, any events for which flags are set in their related objects will be logged to the system logger.
ServerResponseTimeout	The ServerResponseTimeout» indicates how long (in seconds) the ECHO SDK will wait for a response from the connected ECHO server. If a request is made of the ECHO server (for example a modification to a property of one of the SDK objects) and the server does not respond within the time period specified by the ServerResponseTimeout, the error CHSDK_E_OPERATION_TIMED_OUT will be returned to the caller. This could occur if a particularly lengthy operation such as the creation of a very large data file is being requested on a slow machine. It could also occur if the client application is making a request of a remote ECHO archive engine (server) and the network connection is lost before the remote server can respond.

2.3.2 Historian Properties

Use the Offline Configurator (page 43) or the Online Configurator (page 34) to set Historian Properties. The Online Configurator offers a smaller number of settings than the Offline Configurator. The following table lists all of the configurable properties available in the Historian.

Historian Property	Description
ClientFlushRate	The ClientFlushRate indicates how often (in seconds) each Data Stream managed by the Historian sends data modifications to the Component Historian Server. The client application may both read and modify ClientFlushRate.
Descriptor	This property is the string description of the Historian. It may be both read and modified by the client application.
ExtendedData	The ExtendedData property is a user-definable annotation that may be attached to the Historian. Because it is a Variant, it may be of any Variant-compliant data type. It may be both read and modified by the client application.
FillupStrategy	This property allows client applications to read or set a flag that controls how the ECHO archive engine should handle the filling up of all the data files in a given Historian.
LogDataStreamDataCoercionEvents	This property allows client applications to read or set a flag that controls logging of all type conversion events for IData Streams managed by the Historian.
LogDataStreamFilterEvents	This property allows client applications to read or set a flag that controls logging of all data filter events for Data Streams managed by the Historian.
LogDataStreamInsertInOrderEvents	This property allows client applications to read or set a flag that controls logging of all data append events for Data Streams managed by the Historian.
LogDataStreamInsertOutOfOrderEvents	This property allows client applications to read or set a flag that controls logging of all data insert events for Data Streams managed by the Historian.
LogDataStreamManualFlushEvents	This property allows client applications to read or set a flag that controls logging of manual flush events for all Data Streams managed by the Historian.
LogDataStreamPropertyModifyEvents	This property allows client applications to read or set a flag that controls logging of property modification events for all Data Streams managed by the Historian.
LogDataStreamRemoveEvents	This property allows client applications to read or set a flag that controls logging of all data delete events for Data Streams managed by the Historian.
LogDataStreamReplaceEvents	This property allows client applications to read or set a flag that controls logging of all data edit events for Data Streams managed by the Historian.
LogCreateCHDataFileEvents	The LogCreateCHDataFileEvents property allows client applications to read or set a flag that controls logging in the event that new CHDataFiles are created.
LogCreateDataStreamEvents	The LogCreateDataStreamEvents property allows client applications to read or set a flag that controls logging in the event that new Data Streams are created.

Historian Property	Description
LogDeleteDataStreamEvents	The LogDeleteDataStreamEvents property allows client applications to read or set a flag that controls logging in the event that existing Data Streams are deleted.
LogErrorMessages	The LogErrorMessages property allows client applications to read or set a flag that controls logging of warning messages by a given Historian.
LogInfoMessages	The LogInfoMessages property allows client applications to read or set a flag that controls logging of informational messages by a given Historian.
LogManualFlushEvents	The LogManualFlushEvents property allows client applications to read or set a flag that controls logging in the event that a client application requests that the ECHO Archive Engine flush its buffers to disk.
LogPropertyModifyEvents	The LogPropertyModifyEvents property allows client applications to read or set a flag that controls logging in the event that one or more properties of the Historian are modified.
LogWarningMessages	The LogWarningMessages property allows client applications to read or set a flag that controls logging of warning messages by a given Historian.
Name	The Name property allows the client application to set or retrieve the name of the Historian object.
ServerFlushRate	The ServerFlushRate indicates how often (in seconds) the ECHO Archive Engine should flush new data managed by the Historian to disk. The client application may read and modify ServerFlushRate. The ECHO Archive utilizes operating system facilities to write updates to disk at the optimal time. It performs the flush to ensure that that the data has been written to disk. All updates are typically written to disk by the operating system before the flush interval occurs.

2.3.3 Data Stream Properties

Use the Offline Excel Configurator (page 43) or the Online Configurator (page 34) to set Data Stream properties. The Online Configurator offers a smaller number of settings than the Offline Configurator. The following table lists all of the configurable properties available in the Data Stream.

Data Stream Property	Description
DataType	The DataType property is the type to which time-series data values will be converted before they are stored by ECHO. The set of valid types are those defined as VT types in the automation documentation. The client application may either read or set this property.
Descriptor	This property is the string description of the Data Stream. It may be both read and modified by the client application.
DiscardDuplicateTimestamps	The DiscardDuplicateTimestamps property allows client applications to read or set a flag that controls duplicate timestamp filtering for the Data Stream in the ECHO Archive Engine. If set to true, new time-series data elements whose timestamps match existing entries in the Data Stream will not be stored by the ECHO Archive Engine.
DiscardDuplicateValues	The DiscardDuplicateValues property allows client applications to read or set a flag that controls duplicate adjacent value filtering for the Data Stream in the ECHO Archive Engine. If set to true, new time-series data elements whose data values match those of existing adjacent entries in the Data Stream will not be stored by the ECHO Archive Engine.
ExtendedData	The ExtendedData property is a user-definable annotation that may be attached to the Data Stream. Because it is a Variant, it may be of any Variant-compliant data type. It may be both read and modified by the client application.
FutureEditLimit	The FutureEditLimit property allows client applications to retrieve or specify the number of seconds into the future beyond which no time-series data may be added to the Data Stream or modified in it.
LogDataCoercionEvents	The LogDataCoercionEvents property allows client applications to read or set a flag that controls logging in the event that new data being added to the Data Stream must be converted to a type different from that originally used when specified by the client application.
LogFilterEvents	The LogFilterEvents property allows client applications to read or set a flag that controls logging in the event that one or more new values are discarded because of duplicate timestamp or value filtering.
LogInsertInOrderEvents	The LogInsertInOrderEvents property allows client applications to read or set a flag that controls logging in the event that new data is inserted at the end of the Data Stream (that is, in chronological order).
LogInsertOutOfOrderEvents	The LogInsertOutOfOrderEvents property allows client applications to read or set a flag that controls logging in the event that new data is inserted in the Data Stream out of chronological order.

Data Stream Property	Description
LogManualFlushEvents	The LogManualFlushEvents property allows client applications to read or set a flag that controls logging in the event that a client application requests that the contents of the write cache be flushed to the ECHO Archive Engine.
LogPropertyModifyEvents	The LogPropertyModifyEvents property allows client applications to read or set a flag that controls logging in the event that one or more properties of the Data Stream are modified.
LogRemoveEvents	The LogRemoveEvents property allows client applications to read or set a flag that controls logging in the event that data is deleted from the Data Stream. Logging occurs only if data is removed by a client via Data Stream.AsyncRemoveData or Data Stream.SyncRemoveData.
LogReplaceEvents	The LogReplaceEvents property allows client applications to read or set a flag that controls logging in the event that existing data in the Data Stream is modified.
Name	The Name property allows the client application to set or retrieve the name of the Data Stream object.
PastEditLimit	The PastEditLimit property allows client applications to retrieve or specify the number of seconds into the past before which no time-series data may be added to the Data Stream, deleted, or modified in it.
SizeClientWriteCache	The SizeClientWriteCache property allows client applications to read or specify the number of data modification requests (insertions, modifications, or removes) that the ECHO SDK will buffer prior to sending them to the ECHO Archive Engine.
ThrowAwayLimit	The ThrowAwayLimit property allows client applications to specify the length of time that data will be maintained by the ECHO Archive Engine for this Data Stream. It is specified in seconds.
TimePrecision	The TimePrecision property allows client applications to retrieve or set the precision used for timestamps in time-series data when storing or comparing timestamps when reading data.

2.4 Configuration Overview

2.4.1 The PC56 to ECHO Interface Service

The Interface application is a Service that

- scans the tags at their configured scan rate
- sends the scanned tag values to the mapped historian data streams for archiving

The Interface scans the tags that you configured using the Online Excel Configurator (page 23) or Offline Configurator

The Service name is PC56 to ECHO Interface.

Installing the PC56 to ECHO Interface Service

The PC56 to ECHO Interface Service is configured to run automatically as a service when the PC56-HIST is powered up. You can also install or remove the Interface Service manually.

To install the Interface Service

- 1 Click Start, and then click Programs
- 2 On the Programs menu, chose PC56 to Echo
- 3 On the PC56 to Echo menu, choose Interface Service INSTALL.

To remove the Interface Service

Important: You should only remove the Interface Service if you are directed to do so by ProSoft technical support. If the Interface Service is removed, the PC56-HIST will be unable to store historical data.

- 1 Click Start, and then click Programs
- 2 On the Programs menu, chose PC56 to Echo
- 3 On the PC56 to Echo menu, choose Interface Service REMOVE.

Starting and Stopping the Service

The PC56 to ECHO Interface Service is configured to run automatically as a service when the PC56-HIST is powered up.

- You can start or stop the Service from the Service Control Manager in the Control Panel. The Service name is PC56 to ECHO Interface.
- You can also use the XML Loader (page 51, page 50) to start or stop the interface.

Logging and Debugging

Interface Logging

The Interface writes information and error messages to the file PC56ToECHO.log located in the installation directory (typically "C:\Program Files\PC56toECHO").

The Online Configurator (page 23) contains a tool to view the log file (page 41).

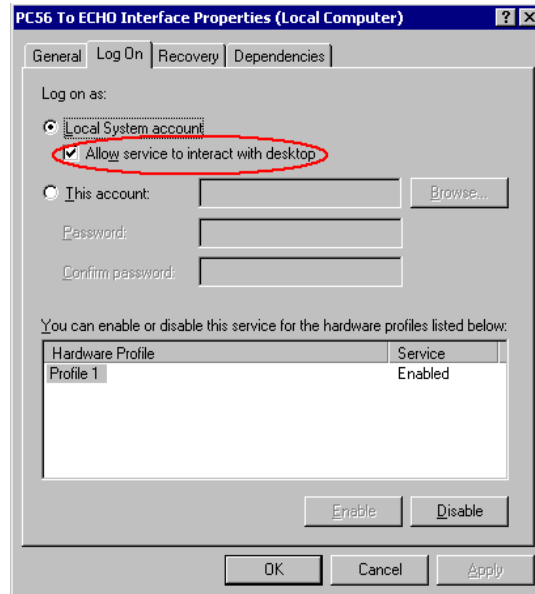
Verify that the Interface is Working

To quickly verify that the Interface is sending tag values to a data stream, use the Recent Values (page 37) list for the data stream in the Online Configurator (page 23).

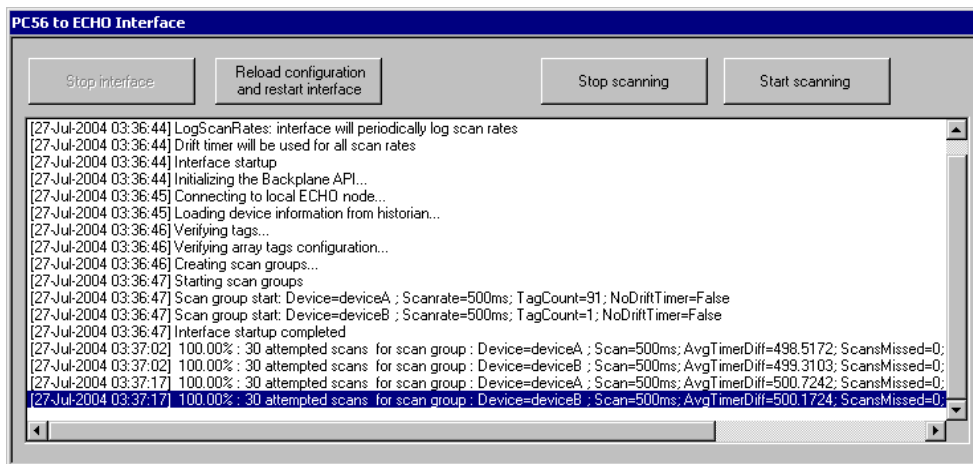
Real-time Monitoring

Note: Real-time monitoring can cause overall system performance to suffer. You should only use real-time monitoring temporarily, to gather interface performance data. When you are finished monitoring real time data, be sure to click the **Stop Scanning** button on the monitor window.

- 1 Set the LogScanRates registry setting to a non-0 value
- 2 Configure the PC56 to ECHO Interface service to Interact with Desktop (Service properties)



- 3 Restart the PC56 to ECHO Interface Service. A window will appear. Every 15 seconds, each scan group will output a message displaying the percent of scheduled scans that succeeded during the last 15 seconds.



Optimizing the Interface

Scan Rates

In order to maximize tag value retrieval, the interface groups tags by their scan rate and device. All tags from the same device and scan rate are placed into a scan group. The number of different scan rates entered for the tags should be limited in some manner to limit the number of scan groups. In other words, having 10 different scan rates is reasonable, but having 500 different scan rates is not.

You should not choose a scan rate lower than the rate at which you must collect the data. Properly grouping tags by scan rate will provide better performance than making wholesale scan rate decisions.

For example, if you must scan 1000 tags: 500 are needed at 500ms and 500 at 250ms, you should not create a single scan group of 250ms. A better arrangement would be one scan group at 500ms, and one at 250ms.

After scan rates have been created you can verify the success of the chosen scan rates. (page 20)

Timers

- There are two timers available for various scan rates. The default timer for all scan rates is the "drift timer". You may use the "no drift timer" for some of your scan rates through the NoDriftMS registry setting.

Drift Timer

- Pro: high performance timer with low overhead will give you the best performance at low scan rates
- Con: may drift over time. For example, a scan rate of 500ms may execute at the following millisecond timers
500, 1000, 1501, 2002, 2503, ...
The timestamps of the data stream would reflect this drift:
01:20:00.500, 01:20:01.000, 01:20:01.501, 01:20:02.002, 01:20:02.503

No Drift Timer

- Pro: will not drift the timestamp over time (see drift example above)
- Con: not as accurate for low scan rates. Tags with low scan rates may miss more scans using this timer

Array Tags

Writing an array tags of X values to one array data streams will provide better performance than writing an array tag of X values to X data streams. The Array tags s (page 31)ection has more information.

2.4.2 Online Configuration with the PC56 HIST to ECHO Configurator

Use the PC56 HIST to ECHO Configurator to add data items (commonly referred to as tags) to the address space in the Interface. Tags in the address space will be scanned by the Interface and sent to the mapped ECHO Data Stream.

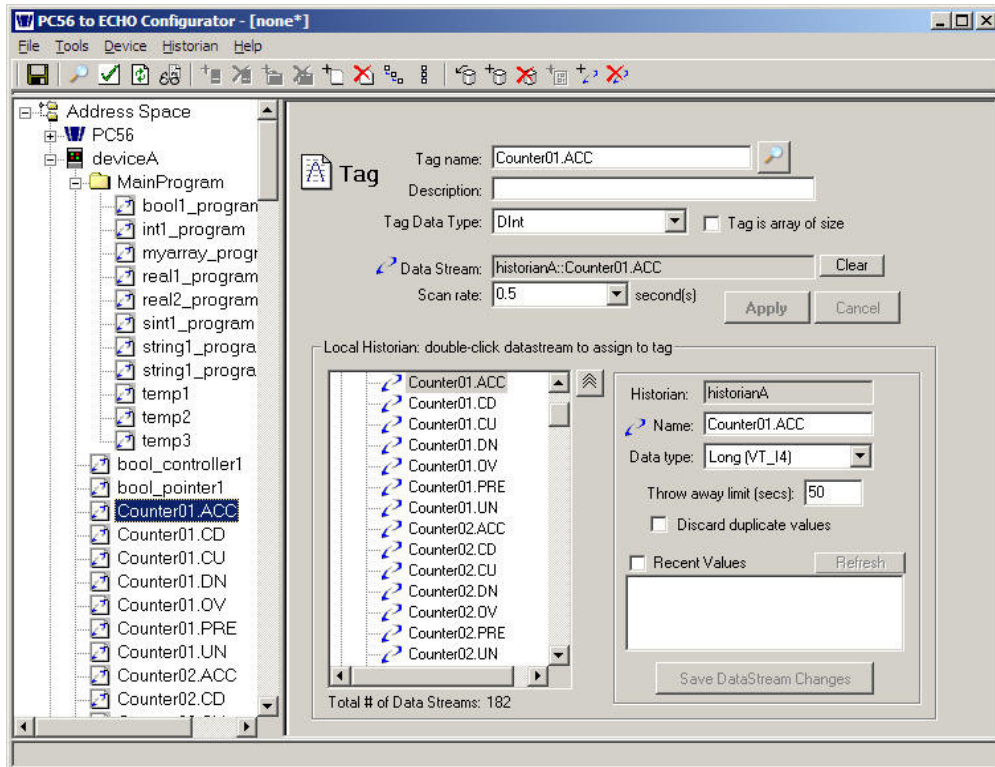
The user interface of the Configurator resembles the Microsoft Windows Explorer. It provides numerous functions to make configuration easier, such as context-based shortcut menus, which you open by clicking the right mouse button.

The left pane of the Configurator displays the configuration tree. At the top of the tree is the Address Space, which contains all of the tags that the Interface will scan. The Address Space is where you add devices, programs, and tags.

The Address Space initially contains a single device, the PC56-HIST itself. There are several predefined tags under the PC56-HIST device, including the current CPU temperature in degrees Celsius. You cannot add any tags under the PC56-HIST device.

Below the Address Space are the subtrees for each ControlLogix Device that the Interface will access.


Select Address Space in the left pane to view a summary of the current configuration.



Adding a Device

Before you can configure the Interface to scan ControlLogix tags, you must first define the ControlLogix Controller device.

To add a device

- Select Address Space in the left pane
- Click the right mouse button on Address Space to open a shortcut menu, and then choose New Device
- OR
- Click the new device button on the tool bar 



Enter a name for the new device

Type the name of the device in the Device Name field. The device name will appear as a branch under the root of the Address Space. All programs and tags associated with this device will appear under this branch.

Path

Next, enter the path to the device. The path describes the communications path from the PC56-HIST to the device. To construct a communications path, enter one or more path segments that lead to the target device. Each path segment takes you from one module to another module over the ControlBus backplane or over a ControlNet or Ethernet network.

Each path segment contains:

`p:x,{s,c,t}:y`

Parameter	Description
<code>p:x</code>	The port number on the device to use for communication
<code>x = 1</code>	ControlBus backplane from any 1756 module
<code>x = 2</code>	ControlNet port from a 1756-CNB module or Ethernet port from a 1756-ENET module
<code>,(comma)</code>	Separates the starting point and ending point of the path segment
<code>{s,c,t}:y</code>	Specifies the address of the module you are going to.
<code>s:y</code>	ControlBus backplane slot number
<code>c:y</code>	ControlNet network node number (1 to 99 decimal)
<code>t:y</code>	Ethernet network IP address (for example, 10.0.104.140)

If there are multiple path segments, separate each path segment with a comma (,).

Examples:

To communicate from the PC56-HIST module in slot 4 of the ControlBus backplane to a module in slot 0 of the same backplane.

`p:1,s:0`

To communicate from the PC56-HIST module in slot 4 of the ControlBus backplane, through a 1756-CNB in slot 2 at node 15, over ControlNet, to a 1756-CNB in slot 4 at node 21, to a module in slot 0 of a remote backplane.

`p:1,s:2,p:2,c:21,p:1,s:0`

To communicate from the PC56-HIST module in slot 4 of the ControlBus backplane, through a 1756-ENET in slot 2, over EtherNet, to a 1756-ENET (IP address of 10.0.104.42) in slot 4, to a module in slot 0 of a remote backplane.

`p:1,s:2,p:2,t:10.0.104.42,p:1,s:0`

Device Type

The only device type currently available is the ControlLogix controller.

After you have entered all of the required information, click the Apply button to save the changes.


Adding a Program

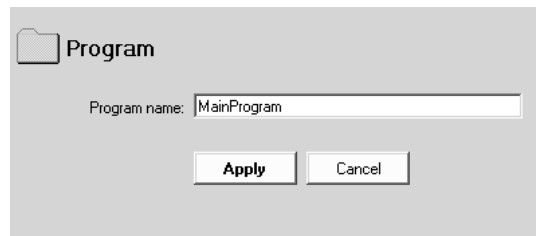
ControlLogix controllers have two types of tags: controller-scoped, and program scoped. Controller-scoped tags can be added directly under the associated controller device.

To add a program-scoped tag:

- 1 Create a program branch under the device.
- 2 To create a program branch, select the controller device in the left pane.
- 3 Select the device, and then click the right mouse button to open a shortcut menu. On the shortcut menu, choose New Program

OR

Click the New Program button on the tool bar .



Program Name

Enter the name of the program. The name entered here must exactly match the program name in the ControlLogix controller.

After you have entered all the required information, click the Apply button to save the changes.

Tags

Predefined tags

Certain tags automatically appear in the PC56-HIST module; these are called predefined tags. Most of the predefined tags are elements of the module identification object.


PC56-HIST Predefined Tags

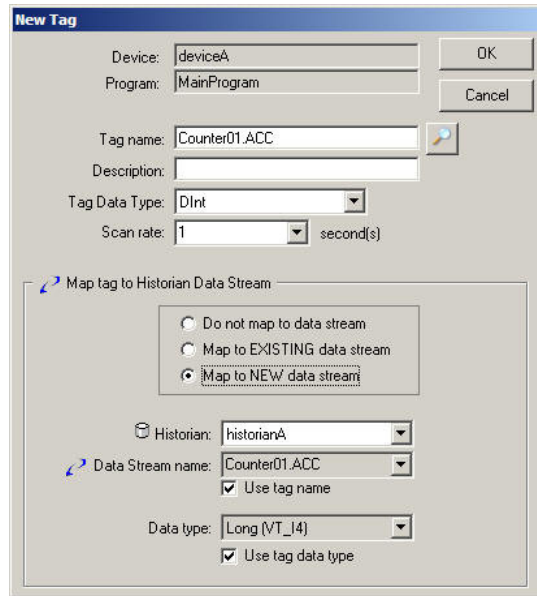
Tag Name	Data Type	Description
DeviceType	INT	Device type code from the module identification object.
MajorRevision	INT	Major revision from the module identification object.
MinorRevision	INT	Minor revision from the module identification object.
ProductCode	INT	Product code from the module identification object.
SerialNumber	DINT	Serial number from the module identification object.
Slot	INT	ControlBus backplane slot number that the PC56-HIST module inhabits.
StatusLED	INT	State of the status (OK) LED indicator on the front panel of the PC56-HIST module. 0 = Green, 1 = Red, 2 = Flashing green/red
SwitchPosition	INT	Position of the 3-position switch on the front panel of the PC56-HIST module. 1 = Top, 3 = Center, 2 = Bottom
Temperature	INT	Temperature of the PC56-HIST CPU in degrees Celsius.
UserLED	INT	State of theUSR LED indicator on the front panel of the PC56-HIST module. 0 = Off, 1 = Green, 2 = Red
VendorID	INT	Vendor code from the module identification object.

Adding a Tag

Tags may be added either directly under a device (controller-scoped tags), or under a program (program-scoped tags).

To add a tag

- 1 Select the associated device or program in the tree view pane.
 - 2 Click the right mouse button to open a shortcut menu, and then choose New Tag
- OR
- Click the new tag button 



Device


Name of the Device

Program

If the tag is being added to a program (program-scoped), the name of the program. If a controller-scoped tag, this field will be blank.

Tag Name

The tag name uniquely identifies a particular tag in the controller. This consists of the tag name along with any additional addressing necessary to specify a single data element. The tag name conventions follow those used in ControlLogix programs. For a description of tag naming, see ControlLogix Tags.

Note: Use the Tag Search (page 38) button  to search a device for tags.

Description

The Description field is provided for your own use, and is not used by the program. You can use this field to enter up to 255 characters of information or notes about the historian and its configuration.

Tag Data Type

Select the data type from the list of supported types. The selected type must match the tag data type in the ControlLogix controller.

Map tag to Historian Data Stream

Use this section to add the tag and map it to a data stream in one step. See Mapping to a data stream (page 29) for more information.

Mapping the Tag to a new Data Stream

The new tag can be mapped to a new or existing data stream. Mapping, at this point, is optional but recommended. A chosen mapping can be edited after the tag is added.

Mapping

Option	Description
Do not map to a data stream:	do not map to a data stream
Map to EXISTING data stream:	map the tag to the chosen historian and data stream
Map to NEW data stream:	map the tag to a new data stream on the chosen historian

Historian

The name of the historian that contains the data stream. Historians listed here already exist. See Historians (page 34) for information on creating new historians.

Data Stream Name

The name of the data stream must be unique within the historian. When mapping to an existing data stream, choose the data stream from the drop-down. When mapping to a new data stream, the data stream will be created when the tag is added.

Option	Description
Use tag name:	sets the data stream name equal to the entered tag name. Use when mapping to a NEW data stream

Data Type

Select the data stream data type from the list of supported types. If desired, the data stream type can be different from the tag data type.

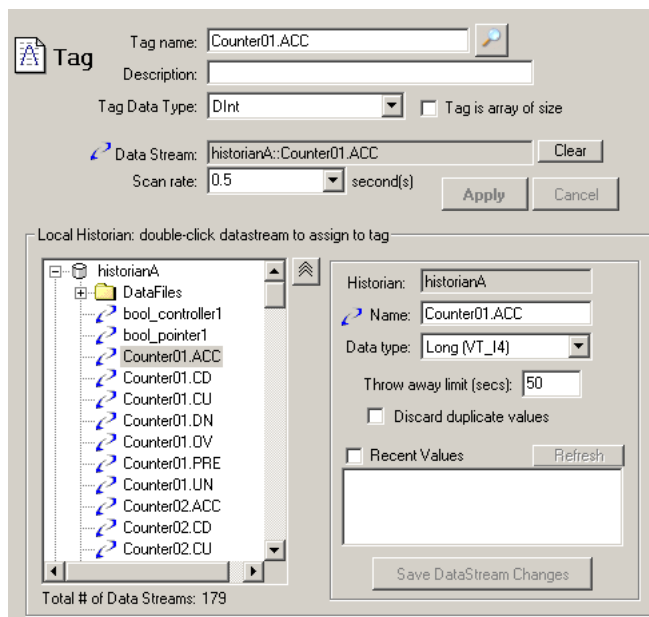
Use tag data type: sets the data stream data type equal to the entered tag data type. Use when mapping to a NEW data stream.

Click OK to add the tag

Edit a Tag

Editing a Tag

After you have created a tag, you can edit the tag and mapping information. Select the tag in the left pane to show the tag details in the right pane.



Tag Name

The tag name uniquely identifies a particular tag in the controller. This consists of the tag name along with any additional addressing necessary to specify a single data element. The tag name conventions follow those used in ControlLogix programs. For a description of tag naming, see ControlLogix Tags.

Note: you can use the Tag Search (page 38) button  to search a device for tags.

Description

The Description field is provided for your own use, and is not used by the program. You can use this field to enter up to 255 characters of information or notes about the historian and its configuration.

Tag Data Type

Select the data type from the list of supported types. The selected type must match the tag data type in the ControlLogix controller.

Tag is array of size





The screenshot shows a configuration window with two fields. The first field is labeled "Tag Data Type:" and has a dropdown menu with "Real" selected. The second field is labeled "Tag is array of size" and has a checked checkbox followed by a text box containing "50" and a dropdown arrow.

If checked, you will be able to enter an array size. This setting signals that the tag being read contains an array of values. Each value has the type specified in "Tag Data Type". The example above shows that the tag contains 50 Real values. See Arrays (page 31) for more information on array configuration.

Data Stream

The path and name of the mapped historian data stream. The syntax used for this mapping is `historian::Data Stream`

To map a different data stream,

- 1 double-click a new data stream in the historian tree 
OR
select a data stream in the historian tree and click the map button 
 - 2 After entering all the required information, click the Apply button to save the changes.
- More about data streams (page 37)

Arrays

The PC56 to ECHO Interface supports tag arrays and data stream arrays.

Tag Arrays

Tag Arrays allow you to read multiple values from a single tag location. The tag specified in the Configurator is the first tag in the array. You specify a tag array using the **Tag is array of size** check box on the Edit Tag dialog box.



The screenshot shows the 'Tag' configuration dialog box. It includes the following fields and controls:

- Tag name:** data1
- Description:** Example Program Tag
- Tag Data Type:** Real (selected from a dropdown menu)
- Tag is array of size:** A checked checkbox followed by a text box containing '50' and a dropdown arrow.

If checked, you will be able to enter an array size. The above example assumes there are 50 real values starting at tag data1.

Tag arrays allow for better performance, because the entire array is retrieved during one read operation.

Note: There is a maximum size of approximately 460 (bytes per value) for tag arrays.

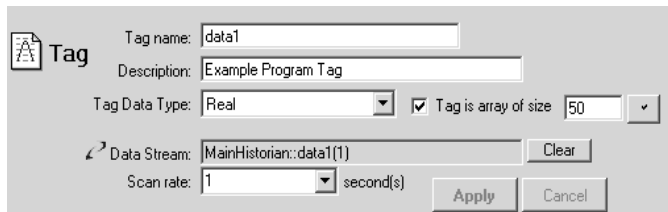
In the above example, a Real value is stored in 4 bytes. Therefore, the maximum array size for this type of tag is approximately 155 values.

Sending Tag Array Values to Data Streams

You have two choices for saving the array values in data streams

- One data stream per array value
Data Stream data type should be equal to the tag data type
- One data stream for the entire array of tag values.
Data Stream data type must be Array (VT_Array)

One data stream per array value



This screenshot shows the 'Tag' configuration dialog box with additional settings for data streams:

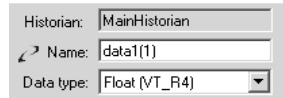
- Tag name:** data1
- Description:** Example Program Tag
- Tag Data Type:** Real (selected from a dropdown menu)
- Tag is array of size:** A checked checkbox followed by a text box containing '50' and a dropdown arrow.
- Data Stream:** MainHistorian::data1(1) (with a 'Clear' button to the right)
- Scan rate:** 1 (selected from a dropdown menu) second[s]
- Buttons:** 'Apply' and 'Cancel' buttons at the bottom right.

The assigned data stream should end with (1)

Example: data stream = data(1)

The data type of the assigned data stream should be compatible with the Tag Data Type.

Example: data type of data stream data(1) is set to Float (VT_R4) because tag data type is Real

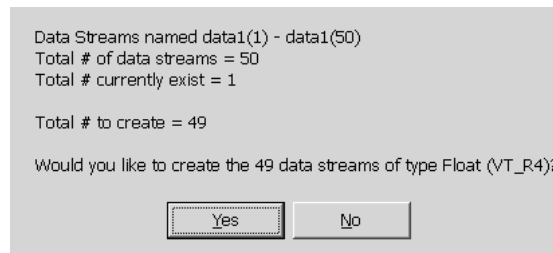


The interface will then write the array values to data streams named data(1) through data(n), where n is the number of array items.

After you create the first data stream, the Configurator can create the required data streams for array elements 2...n.

Use the check button to look at the status of the data streams required to hold the tag array values.

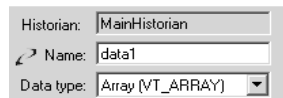
Example: clicking displays the following dialog



Clicking [Yes] will create data streams names data(2), data(3), data(50)

One data stream for the entire tag array

The assigned data stream must be of type Array (VT_ARRAY)



During each scan, the interface will send the array of tag values to this single data stream. This data stream type allows for storage of an array of values.

Comparing storage methods for Array Tags

One array value stored in one data stream:

- Con: this storage method requires more CPU utilization in the interface and historian because there are n writes being performed each scan.
- Pro: easy to access the stored values because each array value is in a separate data stream.

Entire array stored in one data stream:

- Con: access to stored values more difficult because you must retrieve a piece of the stored value (array index) from the array data stream value.
- Pro: better interface performance because each array tag read only requires one write.




Historians and Data Streams

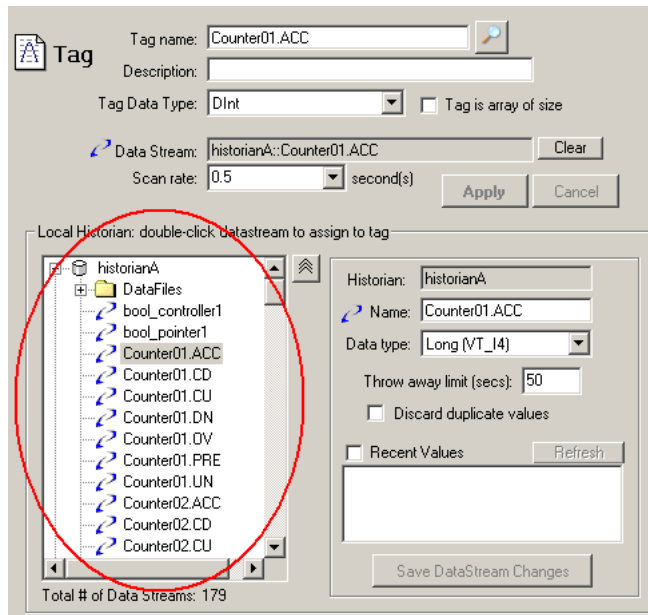
Historian Tree

The Historian Tree

Select any tag in the left pane to show the tag details in the right pane. Underneath the tag details you will see the Historian tree.

This tree lists

- Historians 
- Data Files in the Historian 
- Data Streams in the Historian 




Historians

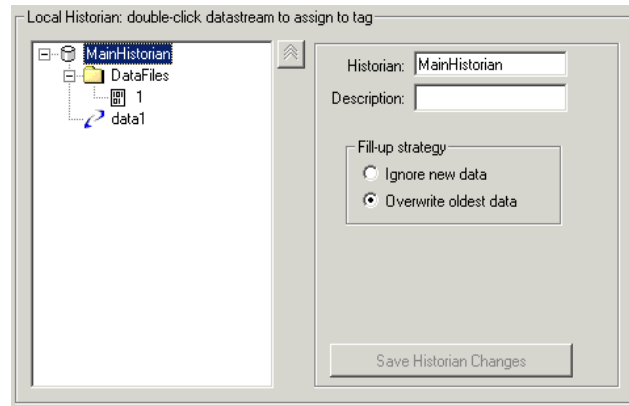
A historian (page 14) is the parent of a data stream. Multiple historians may exist to logically organize data streams. Each historian has configuration parameters, which apply to the data streams in it.

A historian is composed of multiple files, called data files. When you create a historian, a single data file is automatically created to hold data. You can create additional storage by adding data files to a historian.

If you need more information on the historian properties, refer to the PC56 Data Historian overview (page 14)

To Add a New Historian

- right-click the historian tree and choose New Historian
- OR
- click the New Historian button on the toolbar 



Historian

Enter a unique name for the historian.

Description

The Description field is provided for your own use, and is not used by the program. You can use this field to enter up to 255 characters of information or notes about the historian and its configuration.


Fill-up strategy

This setting determines how the historian will handle incoming data when the data file(s) are full.

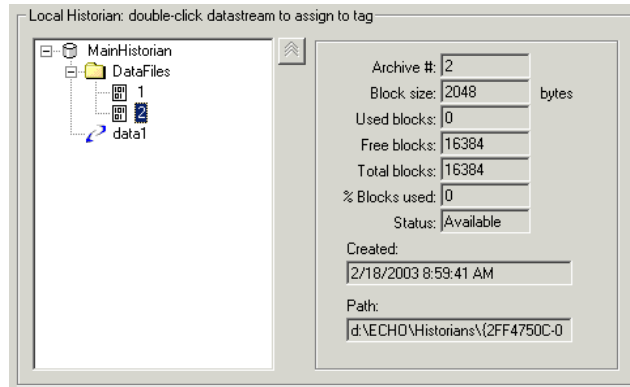
- Select Ignore new data if you want the historian to stop accepting data updates until space becomes available. You can continue to read data; however, you cannot write new data to the historian.
- Select Overwrite oldest data if you want the historian to begin overwriting the oldest data in the data stream being updated. This is the default value.

Data Files

Data Files provide the storage for the data stream values in a historian. A historian is composed of multiple data files. You can create additional storage by adding data files to the historian.

- To Add a new data file to a historian
 - right-click the historian or data files folder and choose New Data File
- OR
- click the New Data File button on the toolbar 

Enter the size of the data file (KB) and click OK



Archive

Automatically assigned when the data file is created.

Block size

Number of bytes in each block in the data file.

Used blocks

The number of blocks in the data file that are currently being used for time-series data storage.

Free blocks

The number of blocks in the data file that are currently available for time-series data storage.

Total blocks

The total number of blocks that the data file contains.

% blocks used

The percentage of blocks in use in the data file.

Status

Active: The data file is the current active file.

Available: The data file is available for use, but is not the active file.

Invalid: Status is invalid for this data file

Created

Date the data file was created.

Path

Path to the data file.

Data Streams

ECHO manages the data historians and the reading/writing of time-stamped data. A set of time-stamped data values is defined as a data stream

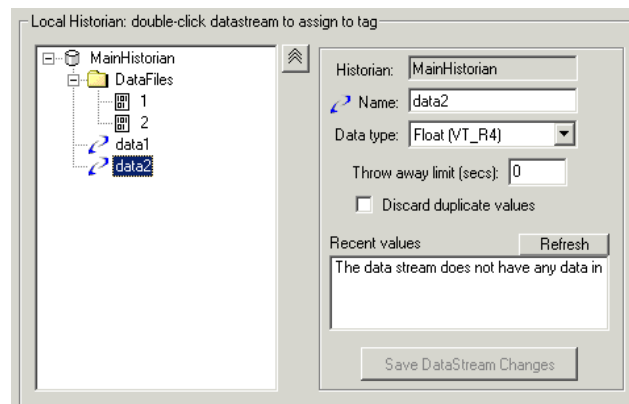
If you need more information on data streams, refer to the PC56 Data Historian Overview (page 14)

To view the data streams, you must select a tag in the left pane of the Configurator.

- To Add a new data stream to a historian
- right-click the historian and choose New Data Stream

OR

- click the New Data File button on the toolbar 



Historian

Name of the historian that contains the data stream.

Name

Name of the data stream

Data Type

The type to which time-series data values will be converted before they are stored in the data stream.

Throw away limit

The length of time that the archive engine keeps data for the data stream. After data file(s) become full, additional write operations overwrite data older than this limit. If set to 0, the Archive Engine will attempt to retain all data, assuming that enough space is available in the data file(s).

Discard duplicate values

If set to true, new time-series data elements whose data values match those of existing adjacent entries in the data stream will not be stored by the Archive Engine.

Recent values

List of the 20 most recent values in the data stream.

After entering the required information, click the "Save Data Stream Changes" button to save the changes.



Tools

Tag Search

The Tag Search Tool allows you to enumerate the tags on a ControlLogix device.

If launched For the New Tag or Edit Tag screen, you can return the tag and data type to the screen.

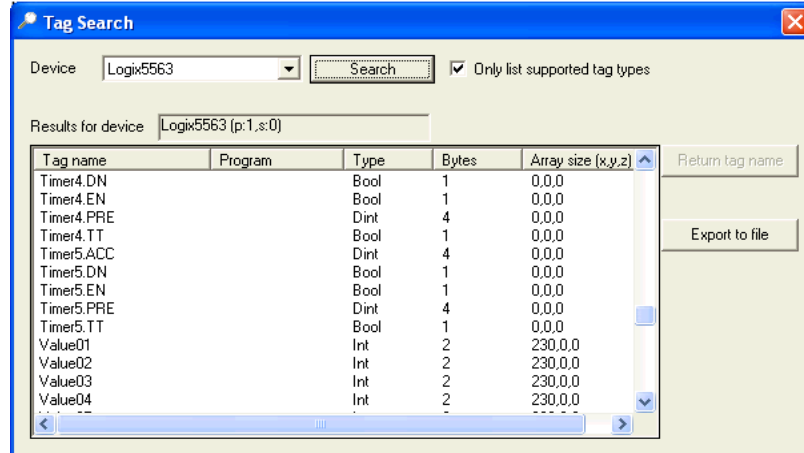
The list of tags can be exported to a CSV file for use in the Offline Configurator.

- To launch this tool:
- Tools...Tag Search from the top menu
-  from the top toolbar
-  Tag Search button from the New Tag (page 27) or Edit Tag (page 30) screen.

The Tag Search Dialog

- Select a configured device from Device drop-down
- Press the [Search] button to search for tags on the selected device

Use the "Only list supported tag types" to list tags with a data type supported by the PC56 to ECHO Interface.



The Search Results

The results for the most recent search include:

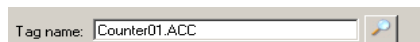
- Tag name: the tag name
- Program: the program name in which the tag exists. This field is blank for controller-scoped tags
- Type: the tag data type
- Bytes: the size of the value in bytes (based on the tag type)
- Array Size: the X, Y, and Z array dimensions for the tag

What does "Error xl_tagsearch:Error: xlGetStructInfo returned 1: API error string> Bad parameter" mean?

This error message occurs when you instruct the P56 to Echo Configurator to do a tag search when the tag is not properly defined in the processor. Refer to FAQ (page 54) for additional information on troubleshooting this error message.

Returning a tag name

If tag search is launched from the New Tag or Edit Tag screen using the Tag Search button to the right of the tag name field:



Click the [Return tag name] button to return the tag name and tag data type.


Export to file

Use the [Export to file] button to save the tag search results to a comma delimited file. This file can be imported by the Offline Configurator to quickly configure many tags.

Verify tags

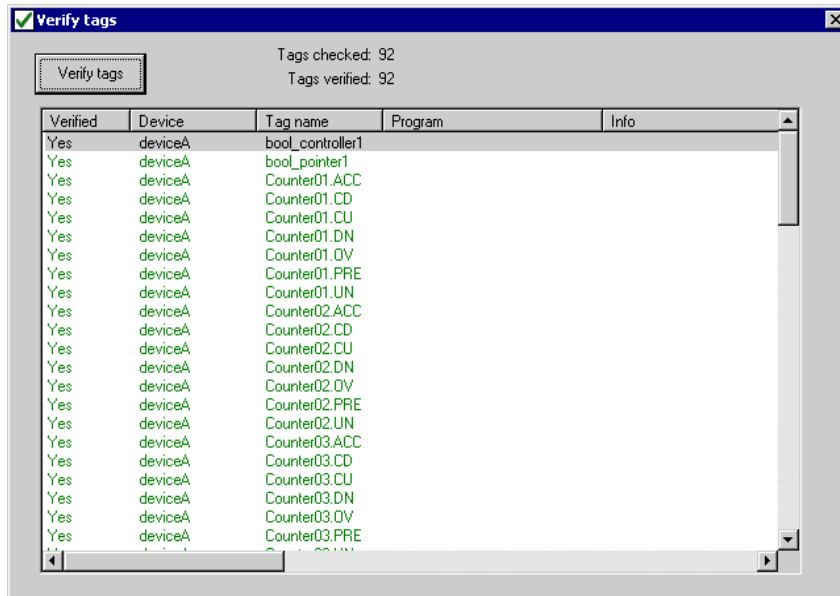
The Tag Verify Tool allows you to validate the tag names and data types configured for each device.

To launch this tool:

- Tools...Verify tags from the top menu
-  from the Configurator's top toolbar

The Tag Verify Dialog

- Click the [Verify tags] button to validate the current list of tags



The Results

At the top, the total number of tag checked and the total number verified are displayed.


For each tag, the results will display

- Verified: Yes or No
- Device: Device name
- Tag name: the name of the tag
- Program: the name of the program for program-scoped tags or blank for controller-based tags

View log file

The View Log File Tool allows you view the PC56 to ECHO Interface log file.

To launch this tool:

- Tools...View interface log file from the top menu
-  from the Configurator's top toolbar

The Interface log file is named PC56ToECHO.log and is located in the installation directory.

The log file is opened in Microsoft Notepad and does not automatically update as new messages appear. To update the contents, close the current log file and re-open

2.4.3 Offline Configuration with the Excel Offline Configurator

The Excel Offline Configurator

The Offline Configurator is a Microsoft Excel workbook which is ideal for configuring bulk tags for the PC56 Data Historian Interface. The output of the Offline Configurator is an XML file that can be used by the XML Loader to perform bulk configuration of the PC56 Data Historian Interface.

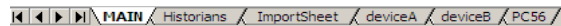
This tool requires Microsoft Excel 2000 or later.

To start the Offline Configurator

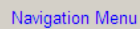
Start Microsoft Excel and open the Excel Workbook named **PC56BulkCfg.XLS**

Using the Offline Configurator

The Offline Configurator contains multiple Worksheets, which are displayed on tabs at the bottom of the application.



To move between the worksheets, select a tab or use the Navigation Menu button visible on many of the worksheets.

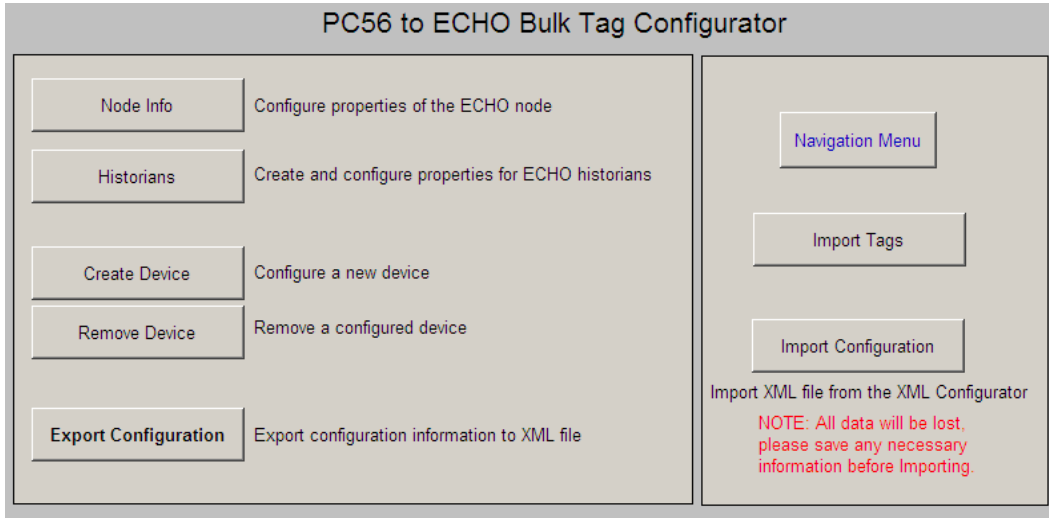


The worksheets include:

- MAIN: the main menu for the Offline Configurator. Allows you to create/delete devices, import tags and export tag configuration
- Historians: configuration for PC56 Data Historians. A historian is the parent of a data stream
- Import Sheet: contains the most recently imported CSV file containing tag information
- Device sheets: all other sheets are device sheets, which define the tags on the device.

Main

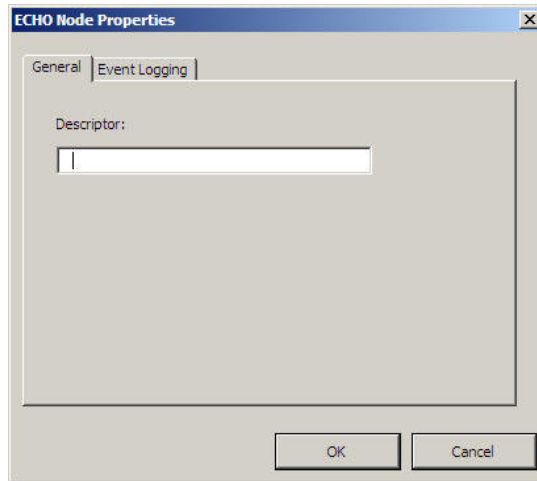
The main menu for the Offline Configurator allows you to create/delete devices, import tags and export tag configuration.



Node info

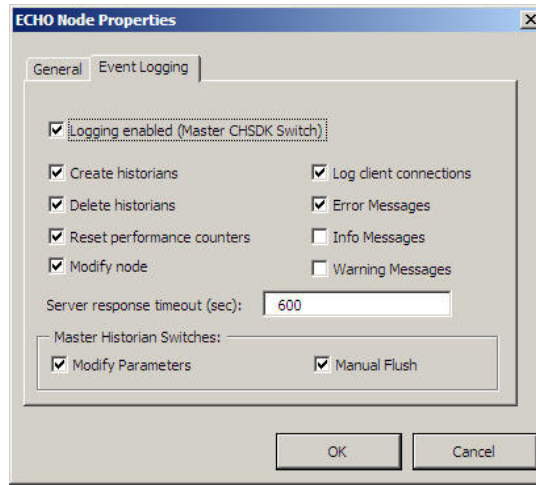
Node Info allows you to configure properties of the ECHO node (page 14).
The ECHO node is the PC56-HIST node.

Note: the default properties for the Node are correct for most users.



Event Logging

Configured logging properties for the Node.



Historians

Historians tab

Allows you to configure, add and edit Data Historians and their properties (page 14). Also allows you to set the default data stream properties for data streams created in each historian.

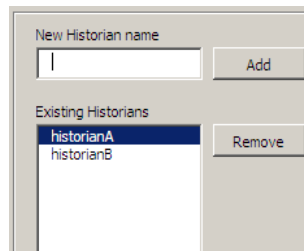
Multiple historians may exist to logically organize data streams. Each historian has configuration parameters that apply to the data streams in it. A historian is composed of multiple files, called data files. The default historian creates a single data file. You can create additional storage by adding data files to a historian.

Notes:

- The default properties for each historian are sufficient for most users. You may want to increase the number or size of the data file.
- Users should not enter values directly into the cells on the Historians worksheet. Use the [Configure Historians] button to change the historian properties (cells).
- The Offline Configurator requires that all data streams created in a historian have the same data stream properties - except for data stream name and data type. These default data stream properties are configured as part of the historian See Default Stream Info below.

Selecting a historian

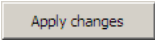
Current historians are listed in the Existing Historians list box.



You can add a new historian by entering the name for the new historian in the New Historian name text box and clicking the [Add] button. To remove a historian, selected the existing historian and click the [Remove] button.

Selecting a historian from the list box will display the properties for the historian. Use the properties (Parameters, Reclamation, Event Logging, and Default Stream Info) to configure the historian.

Note: you must click the [Apply Changes] button to save any changes to the historian

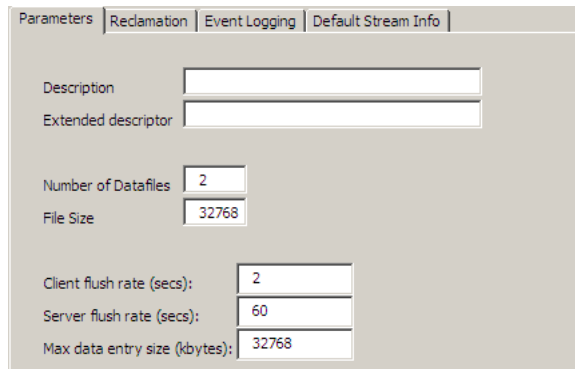


If you need more information on the historian properties, refer to the PC56 Data Historian overview (page 14)

Historian parameters

Enter the optional description and extended descriptor.

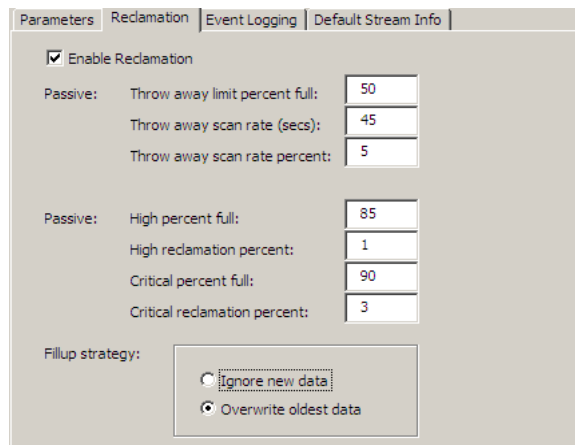
The amount of history available to the data streams in a historian is controlled by the number and size of the data files.



The screenshot shows the 'Parameters' tab of a configuration window. It contains several input fields: 'Description' and 'Extended descriptor' (text boxes), 'Number of Datafiles' (value: 2), 'File Size' (value: 32768), 'Client flush rate (secs):' (value: 2), 'Server flush rate (secs):' (value: 60), and 'Max data entry size (kbytes):' (value: 32768). The tabs at the top are 'Parameters', 'Reclamation', 'Event Logging', and 'Default Stream Info'.

Reclamation

Use Reclamation to specify a strategy for reclaiming archive space and to handle situations when data files become full.



The screenshot shows the 'Reclamation' tab of a configuration window. It features a checked checkbox for 'Enable Reclamation'. Below it are several settings: 'Passive: Throw away limit percent full:' (50), 'Throw away scan rate (secs):' (45), 'Throw away scan rate percent:' (5), 'Passive: High percent full:' (85), 'High reclamation percent:' (1), 'Critical percent full:' (90), and 'Critical reclamation percent:' (3). At the bottom, there is a 'Fillup strategy:' section with two radio buttons: 'Ignore new data' (unselected) and 'Overwrite oldest data' (selected). The tabs at the top are 'Parameters', 'Reclamation', 'Event Logging', and 'Default Stream Info'.

Event logging

Use Reclamation to specify a strategy for reclaiming archive space and to handle situations when data files become full.

The screenshot shows the 'Event Logging' tab of a configuration window. It features a 'Historian Parameters' section with several checkboxes: 'Grow data file', 'Modify parameters', 'Create datastream', 'Delete datastream', 'Create data file', 'Information messages', 'Warning messages', 'Error messages', and 'Aggressive Reclamation'. Below this is a 'Master Datastream Switches' section with checkboxes for 'Modify parameters', 'Manual flush', 'Data coercion', 'Filter', 'Insert out of order data', 'Insert in order data', 'Replace data', and 'Remove data'. The 'Warning messages' and 'Error messages' checkboxes are checked.

Default Stream Info

When you configure a tag on a Device tab, you must enter the target data stream. The device tab allows you to specify the target data stream name, data type, and historian. All other data stream properties will use the "Default Stream Info" values for the chosen historian.

The screenshot shows the 'Default Stream Info' tab of a configuration window. It includes input fields for 'Time precision (secs):' (0.0001), 'Client cache (entries):' (256), 'Throw away limit (secs):' (0), 'Past edit limit (secs):' (0), and 'Future edit limit (secs):' (600). There is a 'Discard duplicate' section with 'Duplicate Timestamps' checked and 'Duplicate Values' unchecked. Below is an 'Event Logging' section with checkboxes for 'Manual flush', 'Modify parameters', 'Data coercion', 'Filter', 'Insert out of order data', 'Insert in order data', 'Replace data', and 'Remove data'. The 'Manual flush' checkbox is checked.

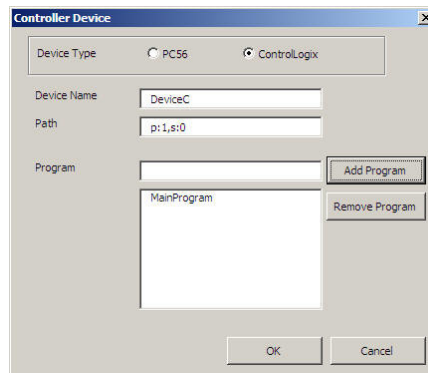
Devices

Device(s) tab

Each device tab allows you to configure the tags on the device.

Creating a device (tab)

- 1 From the Main (page 42) tab, click the [Create Device] button



- 2 Select the device type
- 3 Enter a device name and the device path (page 24).
- 4 Enter the name of each program on the device and click the [Add Program] button to add it to the list of device programs.
- 5 Click the [OK] button to create the device. This will create a new tab using the name of the device.

Configuring a Device

Select the device tab for the device you would like to configure.

ControlLogix Tag Configuration

Device name: deviceA
 Device type: ControlLogix
 Device path: p:1,s:0
 Program(s): first;mainprogram

Navigation Menu

Select (*)	Program	PLC TAGS	PLC Tag Description	PLC Data Type	IsArray	ArraySize	DataStream
*		bool_controller1		Bool			bool_contr
*		bool_pointer1		Bool			bool_pointe
*		Counter01.ACC		Dint			Counter01/
*		Counter01.CD		Bool			Counter01.C
*		Counter01.CU		Bool			Counter01.C

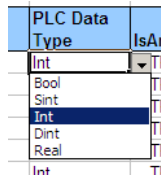
Device information:

- Device name: entered name when the device was created. You may change the name.
- Device type: selected device type: Local (PC56-HIST) or ControlLogix. You cannot change the device type.
- Device path: entered device path when the device was created. You may change the path.
- Program(s): a list of device programs separated by semicolons (;). If you must change the list of programs, make sure the syntax is: program1;program2;...;programN

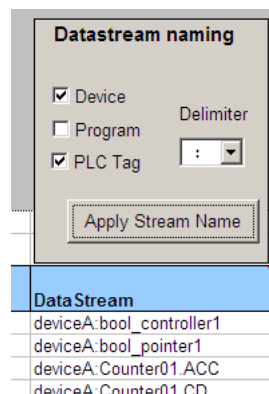
Tag Configuration Information

Each row contains the configuration for 1 tag.

- Select (*): place an asterisks "*" in this column if you would like this tag row to be exported when you export the device. This field allows you to maintain the configuration for all tags on the device but to selectively export a subset of the device's tags.
- Program: the name of the program in which the tag appears or blank for controller-scoped tags. If not blank, the program name must exist in the list of Programs for the device (above).
- PLC TAGS: enter the name of the tag.
- PLC Tag Description: tag description (for your use).
- PLC Data Type: tag data type. If you select a cell in this column, a drop-down of valid types will appear.

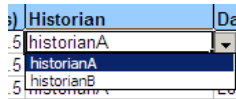


- IsArray: True if the tag is an array (page 31) tag. False or blank if the tag is not an array. Tag Arrays allow you to read multiple values from a single tag location. The tag specified (PLC TAGS column) is the first tag in the array. Tag arrays allow for better performance because the entire array is retrieved during one read operation.
- ArraySize: if IsArray, the number of elements in the array. Note that there are limits on array size (page 31).
- Data Stream: the name of the target data stream that will store the tag values. The [Apply Stream Name] button allows you to set the data stream name for each row based on the combination of the device name, program name and tag name. Select each field to concatenate, select the delimiter character and click the [Apply Stream Name] button. For array tags, multiple data streams may be created using the entered data stream name as the base name. The exported XML file will create the extra data streams is necessary. See array tags (page 31) for more information.

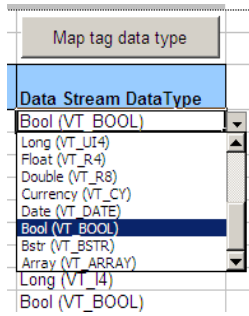


- Scan rate (secs): how often (seconds) you would like the interface to scan the tag value and send to the data stream. Floating point scan rates (.5, .1, .05) are allowed for millisecond scan rates.

- Historian: the historian for the chosen data stream. This historian must exist on the Historian tab (page 43). When a cell in the Historian column is selected, a drop-down of valid historians will appear.



Data Stream Data type: the data type for the data stream. Use the [Map tag data type] button to match the data stream type to the entered tag data type. If you select a cell in this column, a drop-down will appear listing valid data types.



Export

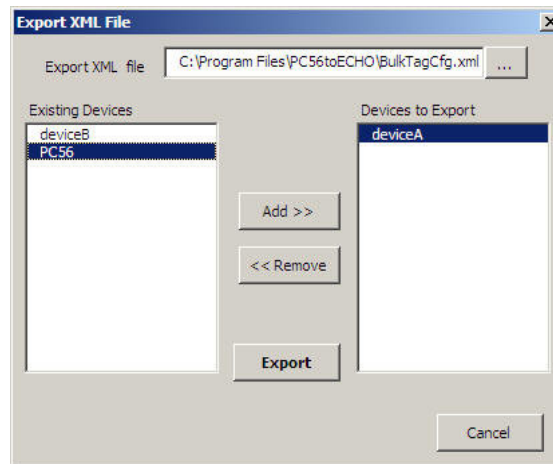
Export Configuration

Export the historian and device configuration to an XML file. This exported file can be transferred to the PC56-HIST machine where the XML Loader (page 51, page 50) can load this configuration information for use by the PC56 to ECHO Interface.

Note: only device tags with an asterisk "*" in the Select (*) column will be exported

Exporting

From the Main (page 42) tab, click the [Export Configuration] button



- Enter XML filename: Enter the path and file name of the XML file
- Select Devices: From the list of Existing Devices, select the device(s) to export. Use the [Add>>] button to add the selected device to the Devices to Export list. Only device tags with an asterisks "*" in the Select (*) column will be exported.
- Export: Click the [Export] button to export the configuration to the XML file

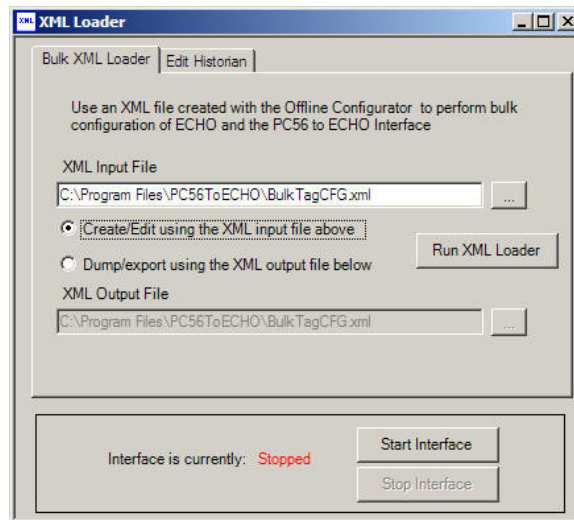
2.4.4 The XML Loader

The XML Loader runs on the PC56-HIST computer and allows you to

- Load an XML file created with the Offline Excel Configurator
- Export the entire ECHO configuration to an XML file
- View/delete the current ECHO historians and data streams
- Start/Stop the PC56 to ECHO Interface

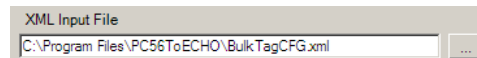
To start the XML Loader:

- Click **Start**, choose **Programs**, and then choose **PC56 to ECHO**, and then chose **XML Loader**. The XML loader is a single property sheet with two tabs.



Load an XML file created with the Offline Excel Configurator

- Transfer the XML file (page 49) to the PC56-HIST computer.
- On the PC56-HIST computer, start the XML Loader.
- Select **Create/Edit using the XML input file above**.
- The XML loader automatically fills in the path and filename of the XML file to import. If you want to import a different file, se the [...] button to browse for the location of the file, or type the complete path and filename of the XML file to import.

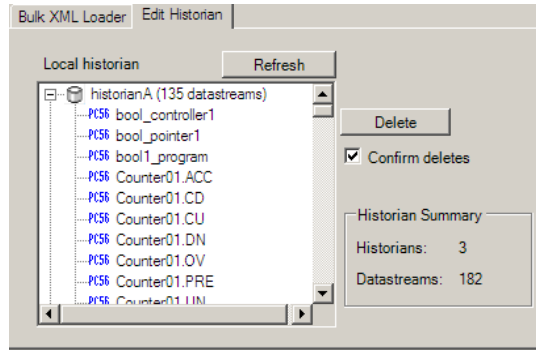


- Click the Stop Interface button to stop the service, if it is running.
- Click . If the interface service is running, the XML loader will prompt you to stop the service before importing the XML file. You will see a window displaying the import progress. When the import is complete, a log file will open in Notepad.exe with the export results.
- Click the Start Interface button to restart the interface service.

Verify that the Configuration has been Exported

- Click the **Edit Historian** tab to view the current configuration.

- Click the **Refresh** button to display the ECHO historians and data streams

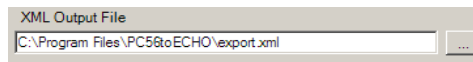


Note: The local historian "PC56_Configuration" contains a data stream for each configured device. This historian is visible only in the Edit Historian tab of the XML Loader, and is not seen in the other configurator tools.

Deleting data streams or historians: Deleting a historian will also delete the data streams in the historian. You will lose all history for any deleted data stream.

Export the entire ECHO configuration to an XML file

- Select **Dump/export using the XML output file below**
- The XML loader automatically fills in the path and filename of the XML file to export. If you want to import a different file, se the [...] button to browse for the location of the file, or type the complete path and filename of the XML file to import.

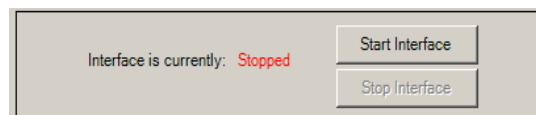


- Click . You will see a window displaying the export progress. When the export is complete, a log file will open in Notepad.exe with the export results.

Start or Stop the PC56 to ECHO Interface

The PC56 to ECHO Interface is installed as a Service, which you can start and stop using the Services applet from the Windows Control Panel.

The XML Loader shows the current status of the interface driver in the bottom part of the window. For convenience, you can start or stop the interface service with the Start Interface and Stop Interface buttons on the XML Loader.



3 Diagnostics and Troubleshooting

In This Chapter

- ❖ Before You Start..... 53
- ❖ FAQ..... 54

3.1 Before You Start

If the system has been working properly, verify that the configuration has not been modified. This includes peripheral PCI module installation, jumper settings, BIOS settings, and cable connections. If needed, a module swap will verify a faulty module. Make sure that the system configuration is correct, and that the module you are replacing the suspect one with is a proven good one.

If the system has not been working properly, or you are installing the module for the first time, then review the jumper and BIOS settings.

3.2 FAQ

What do the LEDs mean?

BAT - If this LED is ON if the battery is low, or if the Battery Enable jumper is not installed. As soon as power is applied to PC56-HIST, a low battery will begin to charge and the BAT LED will return to the OFF state within minutes. Twenty hours of continuous, powered-up operation will fully charge the battery.

USR - This LED is under program control and can be set to RED, GREEN, or OFF. Review the installed software program guide for information and state definitions.

OK - On power up, this LED is set to GREEN. During normal operation, if there is a problem communicating with the ControlLogix backplane it will be set to RED. This LED is under program and API control. It is sometimes referred to as the status LED. Refer to your application and the API manual for information.

How can I tell if a communications port is working properly?

There are two LEDs associated with each communications port the top one is green and the bottom one is yellow:

GREEN: Receive LED. This LED will momentarily turn ON when the serial port is receiving data from another device.

YELLOW: Transmit LED. This LED will momentarily turn ON when the serial port is transmitting data to another device.

Is PC56-HIST slot dependent?

No, but some consideration should be given to making room for any peripheral modules you are plugging onto the PCI bus.

Does the order I plug the PC56-HIST peripherals on to the PCI bus matter?

The PC56-IDE module should always be installed in the first slot to the left of the PC56-HIST (Slot 0). Slot locations are numbered 0 through 2 starting at the first slot location to the left of the PC56-HIST. The PCI slot assignment jumper for each PCI peripheral module should be installed to match its corresponding physical slot location.

What is the maximum number of peripheral PCI modules I can plug onto PC56-HIST?

Three unless otherwise specified.

What does "Error xl_tagsearch:Error: xlGetStructInfo returned 1: API error string> Bad parameter" mean?

This error message occurs when you instruct the P56 to Echo Configurator to do a tag search when the tag is not properly defined in the processor. Refer to Tags (page 27) for more information on defining, adding, mapping and editing tags and arrays.

This error can also mean that the historian is not communicating to the processor. If the PC56-HIST is in a local rack, verify that the PC56-HIST is correctly plugged into the backplane, and that the processor is in RUN mode. If the PC56 is in a remote rack, verify that the module is plugged into the backplane, and then verify that connection between the processor and the remote rack (for example TCP/IP or ControlNet) is functioning properly.

4 Reference

In This Chapter

❖ Product Specifications	58
❖ Memory Map.....	61
❖ Registry Settings	62
❖ Example Programs.....	63
❖ Cable Connections.....	64

4.1 Product Specifications

The in-rack PC with Data Historian is an industrial PC for the ControlLogix platform that provides high speed, time series, data storage and retrieval with both local and remote ControlLogix processors. The in-rack PC with Data Historian allows customers to perform data collection in an efficient, distributed, and cost-effective fashion. In addition, the in-rack PC with Data Historian is the ideal solution for those customers who want to implement an electronic data storage solution while maintaining compliance with FDA Regulation 21 CFR Part 11.

4.1.1 Functional Specifications

- Embedded Pentium MMX CPU
 - 3 Position User Definable Switch
 - Operating Temp. 60°C
 - Front Panel Accessible Reset Switch
 - 4 character alphanumeric Front Panel Status Display
 - 3 Status LEDs
 - Rechargeable Battery
 - Type II Compact Flash Socket
 - Stacking PCI Expansion Bus
 - VGA, USB and Ethernet Ports
- Run typical PC-based applications such as data storage
- Space saving industrial hardware
- Open flexibility to work with or without the ControlLogix / MicroLogix processor
- Built in compact flash or microdrive connection

Included with System:

- Windows XP Professional
- 80GB IDE Hard Drive

Historian

The PC56-HIST uses licensed software technology from OSIsoft to deliver an integrated data historian. The PC56-HIST can log up to 5000 tags of real-time data at sub-second speed accessible using OSIsoft's PI product. This is dependent on the module that is chosen:

PC56-HIST-500LX	500 Tags
PC56-HIST-1500LX	1500 Tags
PC56-HIST-3000LX	3000 Tags
PC56-HIST-5000LX	5000 Tags

Additionally, 5 tags of data can be accessed via an OPC HDA server. This historical data is ideal for sequence-of-event recording, process optimization and compliance reporting (FDA, EPA, and so on).

Historian Scheduler/Server

The Historian Scheduler/Server reads a configuration file and performs real-time scanning of the ControlLogix controller tags, then sends the tag values to the mapped ECHO data streams.

Hardware Specifications

Specification	Description
CPU Processor	Embedded 500 MHz Processor
Memory	512 MB SDRAM System Memory, upgradeable to 1 GB 512 KB SRAM (Battery Backed)
Compact Flash	Compact Flash Type I or II socket
Ethernet Ports (2)	10/100T IEEE 802.3 Ethernet 1500 V rms at 50 Hz to 60 Hz for 60 s, applied as specified in section 5.3.2 of IEC 60950: 1991 Ethernet Broadcast Storm Resiliency = less than or equal to 5000 [ARP] frames-per-second and less than or equal to 5 minutes duration
Serial Port (1)	Isolated Serial RS-232 / RS-422 / RS-485
USB Port	Two USB 2.0 / 1.1 High Speed Host
Connectors	VGA, 2 Ethernet, 2 USB
Battery	Rechargeable Lithium Vanadium Pentoxide
Jumpers	COM 1 Mode Selection Battery Enable/Clear CMOS Boot to SAFE STATE (default settings) Hardware Debugger Support
Switches	Recessed Reset Switch
LED/Display	4-digit alphanumeric status display 3 Status LEDs Red, Green, Off
Real-Time Clock	Precision RTC accurate to +/- 4 minutes per year
Timers	82C54 Timer Clock 14 MHz - Interrupt Interval 1.67619 US
Video	VGA 1920 x 1440 1280 x 1024 256 1024 x 768 56K 800 x 600 16 M 43 Hz Interlaced 56 through 85 Hz Refresh Rates

Environmental Specifications

Item	Specification
Temperature	Non-Operating: 0 to 80°C Operating: 0 to 60°C Note: Storage media may limit operating
Form Factor	Double-slot ControlLogix module
Power Ratings	10 W Max power consumption (Backplane powered)

Operating System

The PC56 modules are ordered and shipped with the selected operating system pre-installed on the module. Operating system version is as follows:

- Windows XP Professional

4.2 Memory Map

Address (hexadecimal)	Size (Kbytes)	Function
000000 to 09FFFF	640	System RAM
0A0000 to 0AFFFF	64	VGA Video Graphics RAM
0B0000 to 0BFFFF	32	VGA Enhanced Mode Graphics RAM
0B8000 to 0BFFFF	32	VGA Text RAM
0C0000 to 0CBFFF	48	VGA BIOS
0CC000 to CFFFFF	16	Free Memory
0D0000 to 0DFFFF	64	Free Memory when ControlLogix [®] configuration jumper is set to 32 bit position. 64 Kbyte allocated by PCI BIOS for dual port memory when ControlLogix [®] configuration jumper is set to 16 bit position.
0E0000 to 0EFFFF	64	System BIOS
0F0000 to 0FFFFF	64	System BIOS
0100000 to 07FFFFFF	1 to 128 Mbyte	System Extended Memory
080000000 to 0C0000000	2 GByte to 3 GByte	Used to map memory windows requested by PCI peripherals

4.3 Registry Settings

Registry settings are located in:

HKEY_LOCAL_MACHINE\SOFTWARE\ProSoft\PC56Historian\

Note: Interface must be restarted to see changes to registry settings

Settings

- Simulate
REG_DWORD
If non-0, Interface will simulate tag values without performing any tag reads.
This allows you to test the interface and ECHO on your desktop.
Default value is 0
- LogScanRates
REG_DWORD
If non-0, Interface will output a summary of missed scans every 15 seconds.
This setting should be temporary!
Default value is 0
- NoDriftMS
REG_DWORD
If 0 or less, all scan rates use a high-precision timer that may drift over time.
if non-0, the value is equal to the minimum scan rate (ms) that will use a non-drifting timer.
All scan rates < NoDriftMS use a high-precision timer that may drift over time.
Default value is 0
- FlushRateSec
REG_DWORD
If >0, the Interface will force an ECHO data flush (flushing all sent values) at the entered interval in seconds.
If = 0, the interface will not perform a manual flush and will depend on the PC56 Data Historian client/server flush properties. Default value is 0.

4.4 Example Programs

A set of sample programs are included with PC56-HIST Companion CD to show some techniques you can use to view and retrieve data.

Microsoft Excel Spreadsheet Example

File Name: PC56HIST.xls

Location: \HistorianSamples\Excel

This is a very basic sample using VBScript to access data for the PC56-HIST. The Excel sample is composed of 3 sheets.

- 1 On the first sheet, specify the node name of the PC56-HIST node name. This sheet allows you to read the available Historians and Data Streams from the PC56-HIST.
- 2 On the second sheet, enter the desired Data Stream into a cell. This sheet allows you to retrieve the latest data values from a specific Data Stream.
- 3 The last sheet behaves the same as the second one, but allows you to retrieve the first data values from the Data Stream.

Visual Basic Example

File Name: PC56HistGetData.vbp and frmMain.frm

Location: \HistorianSamples\VBSource

This sample is a wizard to retrieve data from the PC56-HIST. To use the wizard, follow these steps:

- 1 Enter the Node name of the PC56-HIST.
- 2 Select the Historian from the PC56-HIST (in the sample all the historians are retrieved so the user can select an existing one).
- 3 Select the Data Stream. As with the Historian, the program retrieves all the available Data Streams from the PC56-HIST.
- 4 Select the data the user wants to retrieve. The options are using date retrieve, retrieve the last values or retrieve the first values.
- 5 The last step actually retrieves and displays the values on the screen.

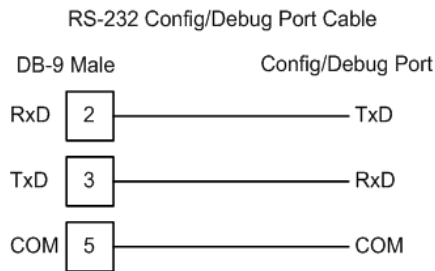
4.5 Cable Connections

The application ports on the PC56-HIST-xxxxLX module support RS-232, RS-422, and RS-485 interfaces. Please inspect the module to ensure that the jumpers are set correctly to correspond with the type of interface you are using.

Note: When using RS-232 with radio modem applications, some radios or modems require hardware handshaking (control and monitoring of modem signal lines). Enable this in the configuration of the module by setting the UseCTS parameter to 1.

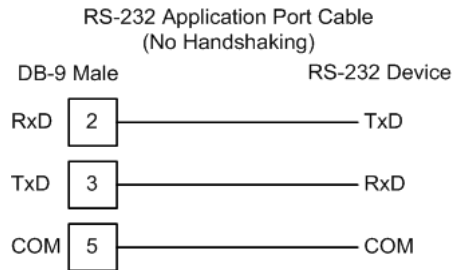
4.5.1 RS-232 Configuration/Debug Port

This port is physically an RJ45 connection. An RJ45 to DB-9 adapter cable is included with the module. This port permits a PC based terminal emulation program to view configuration and status data in the module and to control the module. The cable for communications on this port is shown in the following diagram:



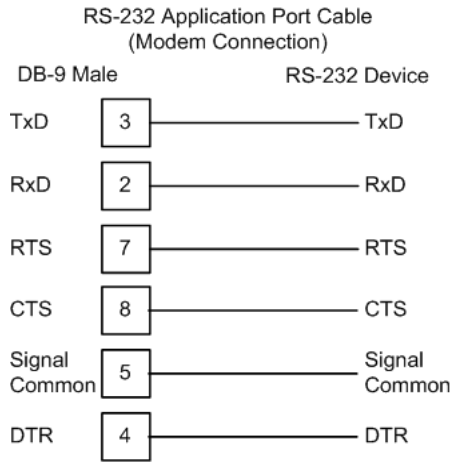
4.5.2 RS-232 Application Port(s)

When the RS-232 interface is selected, the use of hardware handshaking (control and monitoring of modem signal lines) is user definable. If no hardware handshaking will be used, here are the cable pinouts to connect to the port.



RS-232: Modem Connection (Hardware Handshaking Required)

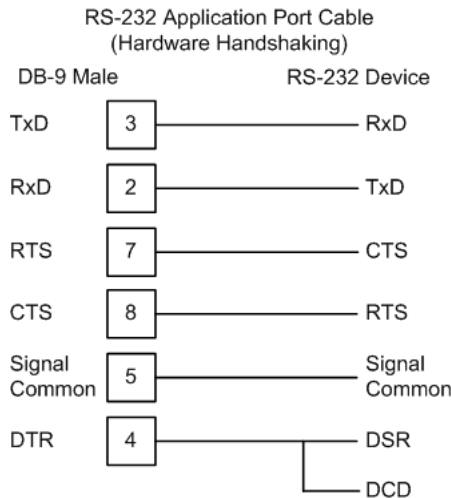
This type of connection is required between the module and a modem or other communication device.



The "Use CTS Line" parameter for the port configuration should be set to 'Y' for most modem applications.

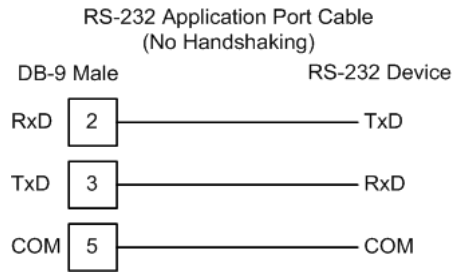
RS-232: Null Modem Connection (Hardware Handshaking)

This type of connection is used when the device connected to the module requires hardware handshaking (control and monitoring of modem signal lines).

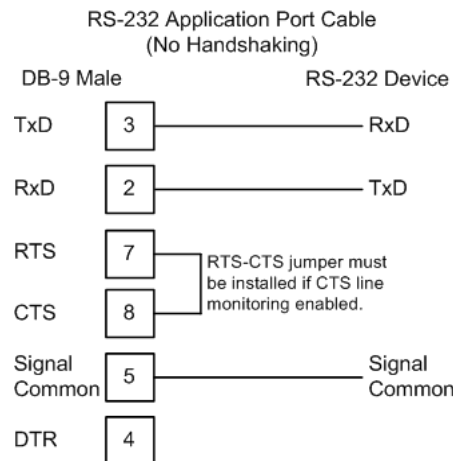


RS-232: Null Modem Connection (No Hardware Handshaking)

This type of connection can be used to connect the module to a computer or field device communication port.

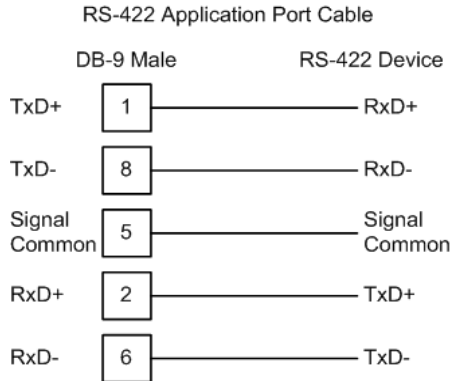


Note: For most null modem connections where hardware handshaking is not required, the *Use CTS Line* parameter should be set to **N** and no jumper will be required between Pins 7 (RTS) and 8 (CTS) on the connector. If the port is configured with the *Use CTS Line* set to **Y**, then a jumper is required between the RTS and the CTS lines on the port connection.



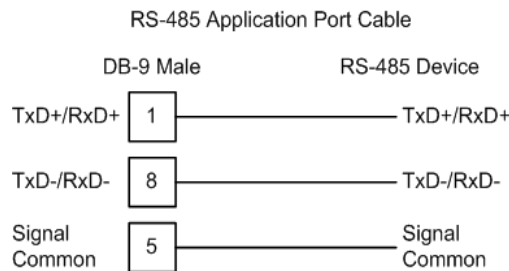
4.5.3 RS-422

The RS-422 interface requires a single four or five wire cable. The Common connection is optional, depending on the RS-422 network devices used. The cable required for this interface is shown below:



4.5.4 RS-485 Application Port(s)

The RS-485 interface requires a single two or three wire cable. The Common connection is optional, depending on the RS-485 network devices used. The cable required for this interface is shown below:

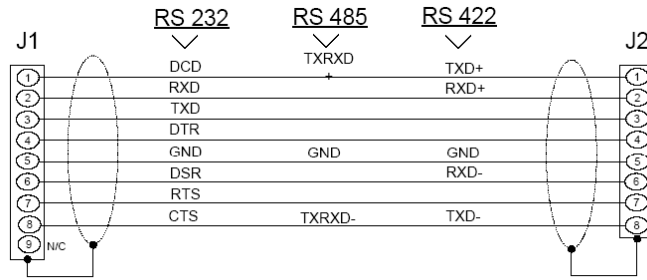
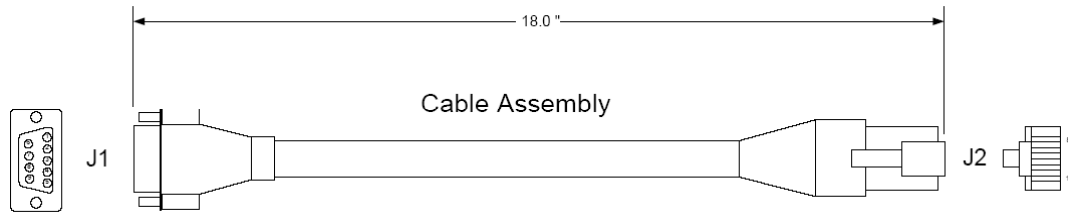


Note: Terminating resistors are generally not required on the RS-485 network, unless you are experiencing communication problems that can be attributed to signal echoes or reflections. In these cases, installing a 120-ohm terminating resistor between pins 1 and 8 on the module connector end of the RS-485 line may improve communication quality.

RS-485 and RS-422 Tip

If communication in the RS-422 or RS-485 mode does not work at first, despite all attempts, try switching termination polarities. Some manufacturers interpret + and -, or A and B, polarities differently.

4.5.5 DB9 to RJ45 Adaptor (Cable 14)



Wiring Diagram

5 Support, Service & Warranty

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❖ Return Material Authorization (RMA) Policies and Conditions	71
❖ LIMITED WARRANTY.....	73

Contacting Technical Support

ProSoft Technology, Inc. (ProSoft) is committed to providing the most efficient and effective support possible. Before calling, please gather the following information to assist in expediting this process:

- 1 Product Version Number
- 2 System architecture
- 3 Network details

If the issue is hardware related, we will also need information regarding:

- 1 Module configuration and associated ladder files, if any
- 2 Module operation and any unusual behavior
- 3 Configuration/Debug status information
- 4 LED patterns
- 5 Details about the serial, Ethernet or fieldbus devices interfaced to the module, if any.

Note: For technical support calls within the United States, an after-hours answering system allows 24-hour/7-days-a-week pager access to one of our qualified Technical and/or Application Support Engineers. Detailed contact information for all our worldwide locations is available on the following page.

Internet	Web Site: www.prosoft-technology.com/support E-mail address: support@prosoft-technology.com
Asia Pacific (location in Malaysia)	Tel: +603.7724.2080, E-mail: asiapc@prosoft-technology.com Languages spoken include: Chinese, English
Asia Pacific (location in China)	Tel: +86.21.5187.7337 x888, E-mail: asiapc@prosoft-technology.com Languages spoken include: Chinese, English
Europe (location in Toulouse, France)	Tel: +33 (0) 5.34.36.87.20, E-mail: support.EMEA@prosoft-technology.com Languages spoken include: French, English
Europe (location in Dubai, UAE)	Tel: +971-4-214-6911, E-mail: mea@prosoft-technology.com Languages spoken include: English, Hindi
North America (location in California)	Tel: +1.661.716.5100, E-mail: support@prosoft-technology.com Languages spoken include: English, Spanish
Latin America (Oficina Regional)	Tel: +1-281-2989109, E-Mail: latinam@prosoft-technology.com Languages spoken include: Spanish, English
Latin America (location in Puebla, Mexico)	Tel: +52-222-3-99-6565, E-mail: soporte@prosoft-technology.com Languages spoken include: Spanish
Brasil (location in Sao Paulo)	Tel: +55-11-5083-3776, E-mail: brasil@prosoft-technology.com Languages spoken include: Portuguese, English

5.1 Return Material Authorization (RMA) Policies and Conditions

The following Return Material Authorization (RMA) Policies and Conditions (collectively, "RMA Policies") apply to any returned product. These RMA Policies are subject to change by ProSoft Technology, Inc., without notice. For warranty information, see Limited Warranty (page 73). In the event of any inconsistency between the RMA Policies and the Warranty, the Warranty shall govern.

5.1.1 Returning Any Product

- a) In order to return a Product for repair, exchange, or otherwise, the Customer must obtain a Return Material Authorization (RMA) number from ProSoft Technology and comply with ProSoft Technology shipping instructions.
- b) In the event that the Customer experiences a problem with the Product for any reason, Customer should contact ProSoft Technical Support at one of the telephone numbers listed above (page 69). A Technical Support Engineer will request that you perform several tests in an attempt to isolate the problem. If after completing these tests, the Product is found to be the source of the problem, we will issue an RMA.
- c) All returned Products must be shipped freight prepaid, in the original shipping container or equivalent, to the location specified by ProSoft Technology, and be accompanied by proof of purchase and receipt date. The RMA number is to be prominently marked on the outside of the shipping box. Customer agrees to insure the Product or assume the risk of loss or damage in transit. Products shipped to ProSoft Technology using a shipment method other than that specified by ProSoft Technology, or shipped without an RMA number will be returned to the Customer, freight collect. Contact ProSoft Technical Support for further information.
- d) A 10% restocking fee applies to all warranty credit returns, whereby a Customer has an application change, ordered too many, does not need, etc. Returns for credit require that all accessory parts included in the original box (i.e.; antennas, cables) be returned. Failure to return these items will result in a deduction from the total credit due for each missing item.

5.1.2 Returning Units Under Warranty

A Technical Support Engineer must approve the return of Product under ProSoft Technology's Warranty:

- a) A replacement module will be shipped and invoiced. A purchase order will be required.
- b) Credit for a product under warranty will be issued upon receipt of authorized product by ProSoft Technology at designated location referenced on the Return Material Authorization
 - i. If a defect is found and is determined to be customer generated, or if the defect is otherwise not covered by ProSoft Technology's warranty, there will be no credit given. Customer will be contacted and can request module be returned at their expense;
 - ii. If defect is customer generated and is repairable, customer can authorize ProSoft Technology to repair the unit by providing a purchase order for 30% of the current list price plus freight charges, duties and taxes as applicable.

5.1.3 Returning Units Out of Warranty

- a) Customer sends unit in for evaluation to location specified by ProSoft Technology, freight prepaid.
- b) If no defect is found, Customer will be charged the equivalent of \$100 USD, plus freight charges, duties and taxes as applicable. A new purchase order will be required.
- c) If unit is repaired, charge to Customer will be 30% of current list price (USD) plus freight charges, duties and taxes as applicable. A new purchase order will be required or authorization to use the purchase order submitted for evaluation fee.

The following is a list of non-repairable units:

- 3150 - All
- 3750
- 3600 - All
- 3700
- 3170 - All
- 3250
- 1560 - Can be repaired, only if defect is the power supply
- 1550 - Can be repaired, only if defect is the power supply
- 3350
- 3300
- 1500 - All

5.2 LIMITED WARRANTY

This Limited Warranty ("Warranty") governs all sales of hardware, software, and other products (collectively, "Product") manufactured and/or offered for sale by ProSoft Technology, Incorporated (ProSoft), and all related services provided by ProSoft, including maintenance, repair, warranty exchange, and service programs (collectively, "Services"). By purchasing or using the Product or Services, the individual or entity purchasing or using the Product or Services ("Customer") agrees to all of the terms and provisions (collectively, the "Terms") of this Limited Warranty. All sales of software or other intellectual property are, in addition, subject to any license agreement accompanying such software or other intellectual property.

5.2.1 What Is Covered By This Warranty

- a) *Warranty On New Products:* ProSoft warrants, to the original purchaser, that the Product that is the subject of the sale will (1) conform to and perform in accordance with published specifications prepared, approved and issued by ProSoft, and (2) will be free from defects in material or workmanship; provided these warranties only cover Product that is sold as new. This Warranty expires three (3) years from the date of shipment for Product purchased **on or after** January 1st, 2008, or one (1) year from the date of shipment for Product purchased **before** January 1st, 2008 (the "Warranty Period"). If the Customer discovers within the Warranty Period a failure of the Product to conform to specifications, or a defect in material or workmanship of the Product, the Customer must promptly notify ProSoft by fax, email or telephone. In no event may that notification be received by ProSoft later than 39 months from date of original shipment. Within a reasonable time after notification, ProSoft will correct any failure of the Product to conform to specifications or any defect in material or workmanship of the Product, with either new or remanufactured replacement parts. ProSoft reserves the right, and at its sole discretion, may replace unrepairable units with new or remanufactured equipment. All replacement units will be covered under warranty for the 3 year period commencing from the date of original equipment purchase, not the date of shipment of the replacement unit. Such repair, including both parts and labor, will be performed at ProSoft's expense. All warranty service will be performed at service centers designated by ProSoft.
- b) *Warranty On Services:* Materials and labor performed by ProSoft to repair a verified malfunction or defect are warranted in the terms specified above for new Product, provided said warranty will be for the period remaining on the original new equipment warranty or, if the original warranty is no longer in effect, for a period of 90 days from the date of repair.

5.2.2 What Is Not Covered By This Warranty

- a) ProSoft makes no representation or warranty, expressed or implied, that the operation of software purchased from ProSoft will be uninterrupted or error free or that the functions contained in the software will meet or satisfy the purchaser's intended use or requirements; the Customer assumes complete responsibility for decisions made or actions taken based on information obtained using ProSoft software.
- b) This Warranty does not cover the failure of the Product to perform specified functions, or any other non-conformance, defects, losses or damages caused by or attributable to any of the following: (i) shipping; (ii) improper installation or other failure of Customer to adhere to ProSoft's specifications or instructions; (iii) unauthorized repair or maintenance; (iv) attachments, equipment, options, parts, software, or user-created programming (including, but not limited to, programs developed with any IEC 61131-3, "C" or any variant of "C" programming languages) not furnished by ProSoft; (v) use of the Product for purposes other than those for which it was designed; (vi) any other abuse, misapplication, neglect or misuse by the Customer; (vii) accident, improper testing or causes external to the Product such as, but not limited to, exposure to extremes of temperature or humidity, power failure or power surges; or (viii) disasters such as fire, flood, earthquake, wind and lightning.
- c) The information in this Agreement is subject to change without notice. ProSoft shall not be liable for technical or editorial errors or omissions made herein; nor for incidental or consequential damages resulting from the furnishing, performance or use of this material. The user guide included with your original product purchase from ProSoft contains information protected by copyright. No part of the guide may be duplicated or reproduced in any form without prior written consent from ProSoft.

5.2.3 Disclaimer Regarding High Risk Activities

Product manufactured or supplied by ProSoft is not fault tolerant and is not designed, manufactured or intended for use in hazardous environments requiring fail-safe performance including and without limitation: the operation of nuclear facilities, aircraft navigation of communication systems, air traffic control, direct life support machines or weapons systems in which the failure of the product could lead directly or indirectly to death, personal injury or severe physical or environmental damage (collectively, "high risk activities"). ProSoft specifically disclaims any express or implied warranty of fitness for high risk activities.

5.2.4 Intellectual Property Indemnity

Buyer shall indemnify and hold harmless ProSoft and its employees from and against all liabilities, losses, claims, costs and expenses (including attorney's fees and expenses) related to any claim, investigation, litigation or proceeding (whether or not ProSoft is a party) which arises or is alleged to arise from Buyer's acts or omissions under these Terms or in any way with respect to the Products. Without limiting the foregoing, Buyer (at its own expense) shall indemnify and hold harmless ProSoft and defend or settle any action brought against such Companies to the extent based on a claim that any Product made to Buyer specifications infringed intellectual property rights of another party. ProSoft makes no warranty that the product is or will be delivered free of any person's claiming of patent, trademark, or similar infringement. The Buyer assumes all risks (including the risk of suit) that the product or any use of the product will infringe existing or subsequently issued patents, trademarks, or copyrights.

- a) Any documentation included with Product purchased from ProSoft is protected by copyright and may not be duplicated or reproduced in any form without prior written consent from ProSoft.
- b) ProSoft's technical specifications and documentation that are included with the Product are subject to editing and modification without notice.
- c) Transfer of title shall not operate to convey to Customer any right to make, or have made, any Product supplied by ProSoft.
- d) Customer is granted no right or license to use any software or other intellectual property in any manner or for any purpose not expressly permitted by any license agreement accompanying such software or other intellectual property.
- e) Customer agrees that it shall not, and shall not authorize others to, copy software provided by ProSoft (except as expressly permitted in any license agreement accompanying such software); transfer software to a third party separately from the Product; modify, alter, translate, decode, decompile, disassemble, reverse-engineer or otherwise attempt to derive the source code of the software or create derivative works based on the software; export the software or underlying technology in contravention of applicable US and international export laws and regulations; or use the software other than as authorized in connection with use of Product.

f) **Additional Restrictions Relating To Software And Other Intellectual Property**

In addition to compliance with the Terms of this Warranty, Customers purchasing software or other intellectual property shall comply with any license agreement accompanying such software or other intellectual property. Failure to do so may void this Warranty with respect to such software and/or other intellectual property.

5.2.5 Disclaimer of all Other Warranties

The Warranty set forth in What Is Covered By This Warranty (page 73) are in lieu of all other warranties, express or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.

5.2.6 Limitation of Remedies **

In no event will ProSoft or its Dealer be liable for any special, incidental or consequential damages based on breach of warranty, breach of contract, negligence, strict tort or any other legal theory. Damages that ProSoft or its Dealer will not be responsible for include, but are not limited to: Loss of profits; loss of savings or revenue; loss of use of the product or any associated equipment; loss of data; cost of capital; cost of any substitute equipment, facilities, or services; downtime; the claims of third parties including, customers of the Purchaser; and, injury to property.

** Some areas do not allow time limitations on an implied warranty, or allow the exclusion or limitation of incidental or consequential damages. In such areas, the above limitations may not apply. This Warranty gives you specific legal rights, and you may also have other rights which vary from place to place.

5.2.7 Time Limit for Bringing Suit

Any action for breach of warranty must be commenced within 39 months following shipment of the Product.

5.2.8 No Other Warranties

Unless modified in writing and signed by both parties, this Warranty is understood to be the complete and exclusive agreement between the parties, suspending all oral or written prior agreements and all other communications between the parties relating to the subject matter of this Warranty, including statements made by salesperson. No employee of ProSoft or any other party is authorized to make any warranty in addition to those made in this Warranty. The Customer is warned, therefore, to check this Warranty carefully to see that it correctly reflects those terms that are important to the Customer.

5.2.9 Allocation of Risks

This Warranty allocates the risk of product failure between ProSoft and the Customer. This allocation is recognized by both parties and is reflected in the price of the goods. The Customer acknowledges that it has read this Warranty, understands it, and is bound by its Terms.

5.2.10 Controlling Law and Severability

This Warranty shall be governed by and construed in accordance with the laws of the United States and the domestic laws of the State of California, without reference to its conflicts of law provisions. If for any reason a court of competent jurisdiction finds any provisions of this Warranty, or a portion thereof, to be unenforceable, that provision shall be enforced to the maximum extent permissible and the remainder of this Warranty shall remain in full force and effect. Any cause of action with respect to the Product or Services must be instituted in a court of competent jurisdiction in the State of California.

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