

Rockwell Automation

*ControlLogix
AutoMax DCSNet and
AutoMax Remote I/O
Communication Interface
Module*

User Manual

(Cat. No. 56AMXN/B)

Rockwell
Automation

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. “Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls” (Publication SGI-1.1) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

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- identify a hazard
- avoid the hazard
- recognize the consequences

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56AMXN/B AutoMax DCSNet/RE RIO Module

Overview

This document is a user guide for the 56AMXN/B module, which allows a Rockwell Automation ControlLogix backplane to communicate with an AutoMax DCS network or an AutoMax Remote I/O network. The module can act as a DCS master, a DCS slave or a remote I/O master.

For DCS master or slave operation, the 56AMXN/B uses a specific RSLogix 5000 56AMXN module profile; for Remote I/O Master operation, it uses the 1756-MODULE generic module profile.

As a DCS master, the module:

- Scans up to 55 slave drops
- Transmits 8 words of broadcast data
- Maintains standard DCS diagnostic counters
- Supports up to 8 scheduled connections with the ControlLogix processor for drop data. Each scheduled connection supports up to 7 drops of input data from slaves to the master and 7 drops of output data from the master to slaves. The connections can update at RPIs from 3 to 750 ms.
- Supports a separate connection for broadcast data, at a fixed update rate of 3 ms.
- Allows access to unmapped input, output and diagnostic data using the Logix MSG instruction or using PCCC messages from RSLinx and other HMIs

As a DCS slave, the module:

- Acts as any drop from 1 to 55, with drop depth from 1 to 55, with 32 words of input data and 32 words of output data per drop
- Receives 8 words of broadcast data from the master
- Monitors the input and output data on others drops on the network
- Maintains standard DCS diagnostic counters
- Supports up to 8 scheduled connections with the ControlLogix processor. Each connection supports up to 7 drops of slave input data from the module to the master and 7 drops of output data from the slave to the master. The connections can update at RPIs from 3 to 750 ms.

As a Remote I/O master, the module:

- Scans up to 7 drops

- Supports up to 248 words of scheduled output data and 250 words of scheduled input data
- Maintains diagnostic counters

As either a DCS master or slave, the module supports bridging, which means that it can obtain its transmit data for any drop from another 56AMXN module in the same chassis.

You can use a DDE or OPC server, such as RSLinx, capable of accessing the ControlLogix backplane, to access the DCS data directly on the 56AMXN. The module "emulates" PLC-5 integer files 100-155. Each file corresponds to a DCS drop.

A watchdog timer is implemented in the module's hardware. If the firmware does not kick the watchdog within the timeout period the watchdog times out and places the module into a safe fatal failure state.

A jabber inhibit timer is implemented in the module's hardware. If the network transmitter is on longer than 150% of the longest network frame time, the jabber inhibit forces the transmitter off and places the module into a safe fatal failure state.

The module firmware can be updated using ControlFlash.

Differences from the 56AMXN/A

For DCS Master and Slave operation, there is now an RSLogix 5000 56AMXN Module Profile. You configure the module as a 56AMXN in RSLogix 5000, not using the 1756-MODULE generic module profile. This results in better diagnostics for the 56AMXN in RSLogix 5000.

The 56AMXN/B can exchange much more scheduled data with the ControlLogix processor than the 56AMXN/A could.

The DCS Master or Slave configuration data is stored with the RSLogix 5000 program. No separate DCS configuration file or configuration program is required. It also makes the use of the configuration signature unnecessary.

Remote I/O configuration is unchanged. You configure the 56AMXN using the Generic Module profile in RSLogix 5000 and use the 56AmxnRioCfg program to configure the module.

The way the 56AMXN/B handles outputs in program mode and on loss of connection is different from the way they were handled by the 56AMXN/A.

In DCS master or slave operation, if the ControlLogix was in program mode, outputs from the 56AMXN/A continued to be updated with the current values from the ControlLogix. If there was a loss of connection between the ControlLogix processor and the 56AMXN, outputs held their last state.

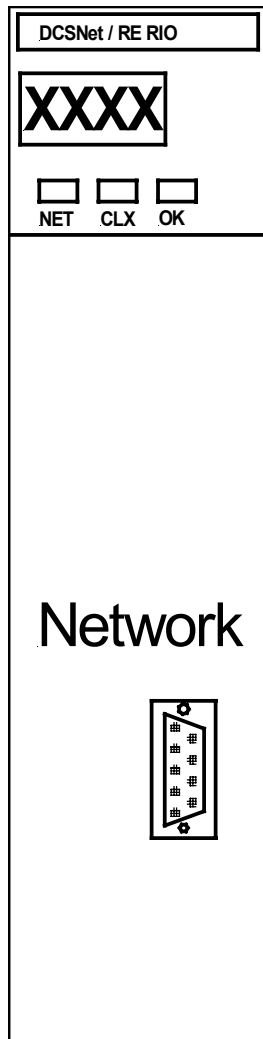
In remote I/O operation, if the ControlLogix was in program mode, the 56AMXN/A set outputs to 0. If there was a loss of connection, outputs held their last state

The 56AMXN/B firmware sets the outputs to 0 in program mode or on loss of connection in DCS Master and Slave and Remote I/O operation.

The 56AMXN/B is backward compatible with the 56AMXN/A. Applications written for the 56AMXN/A do not require modification to run on the 56AMXN/B. However if you want existing applications to use the multiple connection feature of the 56AMXN/B, those applications must be modified.

The firmware in a 56AMXN/A can be FLASH upgraded to 56AMXN/B operation. Refer to page 67 for details.

Hardware Features



The following diagram shows the features of the module.

The module has:

- A label to indicate that it is a scanner for AutoMax DCS and remote I/O
- A 4-character scrolling display (XXXX)
- 3 LEDs, labelled NET, CLX, and OK, to indicate the status of the network, the connection to the ControlLogix processor, and its own internal state
- a 9-pin D-shell connector to connect to the DCS or remote I/O network
- switches at the top of the module to set the mode of operation and the drop number and drop depth

The module hardware consists of:

- Processor – 100MHz IDT MIPS
- FLASH memory - 1Mbyte (512Kx16)
- Local RAM - 1Mbyte (256Kx32) 50Mhz synchronous SRAM
- Shared RAM - 512Kbyte (128Kx32) 20ns asynchronous SRAM

Other Requirements

To use the configuration or monitor programs, you require RSLinx OEM or above. You cannot use RSLinx Lite.

To use multiple connections, you need RSLogix 5000 version 12.00 or above.

Installation

Prevent Electrostatic Discharge



The module is sensitive to electrostatic discharge.

ATTENTION: Electrostatic discharge can damage integrated circuits or semiconductors if you touch backplane connector pins. Follow these guidelines when you handle the module:

- Touch a grounded object to discharge static potential
- Wear an approved wrist-strap grounding device
- Do not touch the backplane connector or connector pins
- Do not touch circuit components inside the module
- If available, use a static-safe work station
- When not in use, keep the module in its static-shield packaging

Set the Switches

The module's mode of operation depends on the settings of the rotary switches at the top of the module. Before you install the module in the rack, set the switches as shown in the table.

Drop MSD	Drop LSD	Depth MSD	Depth LSD	AutoMax Network Operation
0	0	0	0	DCS Master
X	X	Y	Y	DCS Slave Drop XX (1-55), Depth YY (1-55)
0	0	0	1	RIO Master

Table 1 56AMXN Switch Settings

Any other settings are invalid and result in the module going into “Thumbwheel test” mode. In thumbwheel test mode, the display shows the current switch settings. It doesn't go out of thumbwheel test mode until you turn off the power and set the switches to valid numbers.

In thumbwheel test mode, the 56AMXN initially displays “Thumb Test Mode” on the 4-character display, displays the switch settings for 5 seconds, then resumes displaying “Thumb Test Mode”

For DCS slave operation, if the drop number and drop depth are individually valid but the combination results in invalid drop numbers (for example, drop number 55, drop depth 2), the module displays an

error message on the 4-character display but does not enter Thumbwheel test mode.

Prepare the Chassis for Module Installation

Before you install the module, you must install and connect a ControlLogix chassis and power supply. To install these products, refer to the installation instructions you received with them.

Determine Module Slot Location

This example shows chassis slot numbering in a 4-slot chassis. Slot 0 is the first slot and is always located to the right of the power supply. You can use any size ControlLogix chassis and install the module in any slot.

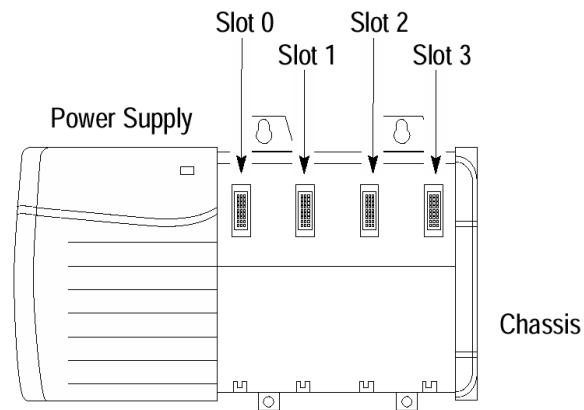


Figure 1 Chassis Slots

You can use multiple modules in the same chassis.

Insert the Module in the Chassis

This module is designed to be installed or removed while chassis power is applied.



ATTENTION: When you insert or remove the module while backplane power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

Repeated electrical arcing causes excessive wear to contacts on both the module and its mating connector. Worn contacts may create electrical resistance that can affect module operation.

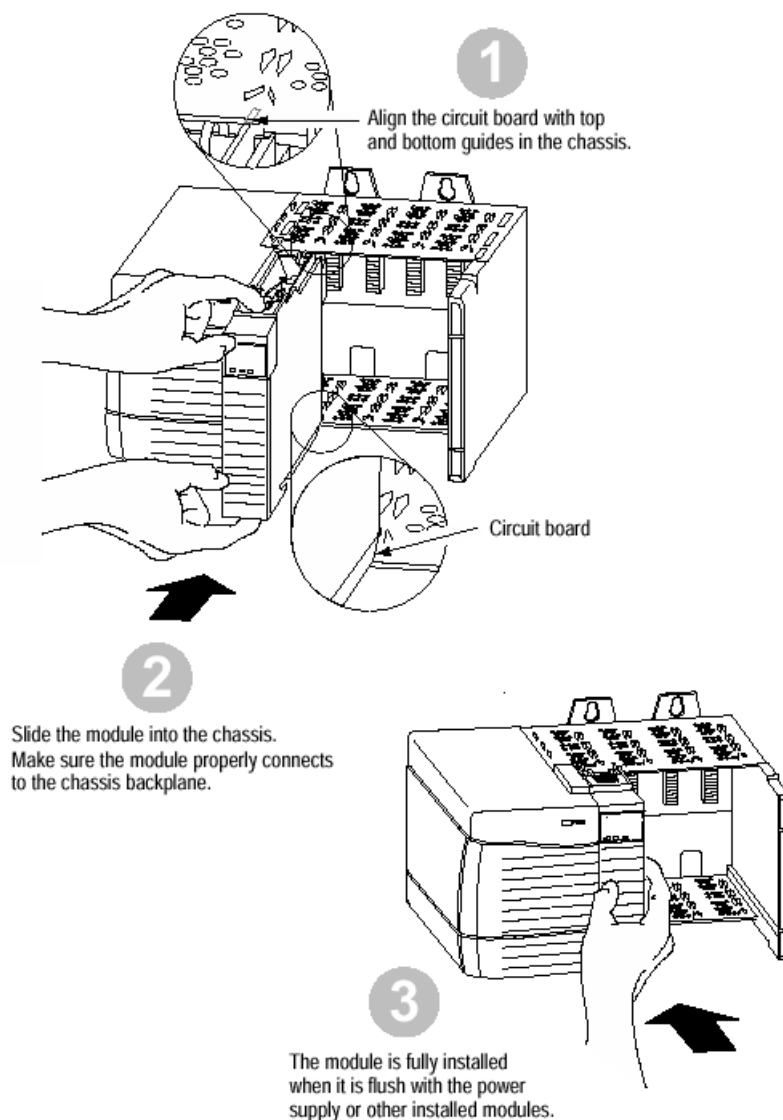


Figure 2 Inserting the 56AMXN

Cabling and Termination

Use drop cable (612574-36R) and passive tap (M/N 57C380) to connect the module to the coaxial network cable. This cable turns down and has a ferrite to reduce EMI. This cable must be used in CE applications. You can also use drop cable 612403-036R which points up.

The drop cable is a 3-foot long multiconductor cable with 9-pin D-shell connectors at each end. Connect one end to the connector on the module and the other end to the passive tap.

The passive tap has two BNC connectors for connection to the coaxial cables and terminating loads.

The network coaxial cable must be terminated with 75 ohm terminating loads attached to the taps at the physical ends of the network. There should be two and only two terminators on the network.

For DCS, the network cable can be RG-59/U or RG-11/U. For remote I/O, the cable must be RG-59/U.

Software Installation

The 56AMXN is supplied with a CD that includes the configuration and monitoring programs for the 56AMXN.

RSLinx should be installed before you install the 56AMXN software. The 56AMXN software requires RSLinx OEM or Professional; it does not work with RSLinx Lite.

You must delete any previous version of the 56AMXN software before you can install a new version. Use the Windows Control Panel Add and Remove Programs to remove the old version.

Insert the 56AMXN CD with the module software and run the program setup.exe on the CD.

Messages about DTL32.DLL when you install or run the programs indicate problems with the RSLinx installation. Confirm that you are have RSLinx OEM or RSLinx Professional (not RSLinx Lite) installed.

Quick Start

The following sections provide a brief summary of the steps necessary to get the module running in each mode.

DCS Master and Slave

1. Set the switches on the 56AMXN module and install the module in the ControlLogix rack.
2. Run RSLogix 5000. If there a choice of RSLogix versions, select version 12 or above.
3. Create a new file or open an existing file. If necessary, select the appropriate processor properties.
4. Right click on I/O Configuration Folder, or on the bridge module in the desired remote chassis in the I/O Configuration Folder, and select New Module from the menu.
5. Select 56AMXN from the list and click OK.
6. Give the module a name and description and select the slot.
7. Select an appropriate Comm Format. either Master - 56 Drops or Slave – 56 Drops.
8. Click Next.
9. Select the Requested Packet Interval (RPI) for data update.
10. Click Finish>>
11. Save the program and download it to the ControlLogix Processor.

Remote I/O Master

1. Set the module switches and install the module in the ControlLogix rack.
2. Connect the module to the remote I/O network. (The 56AMXN must be connected to the network to read the configuration.)
3. Run the 56AmxnRioCfg program and connect to the module using RSLinx.
4. Perform an Actions/Auto Config command to read the network configuration and store it on the 56AMXN.
5. Select File/Export Tags to export the tags to a CSV file.
6. Run RSLogix 5000 and configure the module. Remember to enter the Configuration Signature (see page 38 for details).
7. Import the tags you exported from 56AmxnRioCfg into RSLogix 5000.

8. You can now write your ladder logic using the tags you imported, download the program, etc.

Connections and Tags

Connections

When you add a 56AMXN to the I/O Configuration of a ControlLogix, a broadcast data connection and from one to eight data connections are created. The number of connections is determined by the Comm Format you select when you add the 56AMXN module.

The broadcast connection always updates every 3 ms.

The data connections update at a rate from 3 ms to 750 ms, based on the RPI selected on the Connection tab for the module entry. All data connections update at the same rate.

The broadcast connection contains the broadcast data the DCS master transmits. If the 56AMXN is the DCS master, the ControlLogix writes to output data in the broadcast connection to send the data to remote drops. If the 56AMXN is a DCS slave, the ControlLogix reads input data from the broadcast connection to receive the broadcast data transmitted by the master.

The data connections contain the drop data. Each data connection consists of 7 blocks of data. Each block contains the input data and the output data for one drop. You select which drops are mapped into a block by writing to the Config (C) tag for the 56AMXN. Input and output data for different drops can be mapped into the same block. The same drop cannot be mapped to more than one block. By default the blocks are mapped to consecutive drops.

The number of drop data tags created depends on the type of connection you select when you add the 56AMXN to the I/O configuration, for example, Master – Drops, Master, 14 Drops, Slave – 7 Drops, etc. You cannot change the Comm Format after you create the module; to change the Comm Format you must delete the current module and create a new one.

Listen Only Comm Formats

You can also create a 56AMXN in the I/O Configuration with a listen only Comm Format. A listen only Comm Format lets the ControlLogix receive only input data. An owning connection must exist for a listen only connection to work. The listen only Comm Format must be the same size as the owning Comm Format or smaller.

A listen only connection has no configuration data. All configuration is done in the owning connection.

For example, if one ControlLogix uses a Master – 28 Drops Comm Format to a 56AMXN, another ControlLogix can use a Master – Listen Only 28 Drops Comm Format to obtain input data from the same 56AMXN. (It can also use a 7, 14 or 21 Drops Listen Only Comm Format as well.) The ControlLogix with the listen only Comm Format

will see the same input data as the ControlLogix with the owning Comm Format, but it will have no configuration or output data tags.

More than one processor can use a Listen Only Comm Format to obtain input data from the same 56AMXN, as long as an owner exists.

Remote Connections

If you are using a 56AMXN in a remote rack, for example a rack connected to the rack that holds the processor using ControlNet or Ethernet, it may be necessary to increase the RPI used to connect to the 56AMXN, as the intermediate network may not have sufficient bandwidth to support the fastest RPIs, especially for the larger Comm Formats (Master – 56 Drops, etc). In particular, 10 megabit Ethernet has insufficient bandwidth to support the 56AMXN/B over a remote connection.

Tags

Associated with each 56AMXN are several tags.

File	Description
C	Configuration tag
I	Input data for broadcast connection
O	Output tag for broadcast connection
I0 – I7	Input drop data tags
O0 – O7	Output drop data tags

Table 2 56AMXN Tags

The terms input and output are used from the point of view of the 56AMXN. If the 56AMXN is a DCS master, output data is data the module sends to remote drops; input data is data received from remote drops. If the 56AMXN is a DCS slave, output data is data it is sending to the DCS master; input data is data it is receiving from the DCS master or data other drops are sending to the master.

Configuration Tag

The contents of the configuration tag determine how the drop data maps into the ControlLogix drop data tags.

Tag Name	Value	Force M	Style	Type
Local:3:C	{...}	{...}		AB:56AMXN:C7:(
Local:3:C.InputDropMap	{...}	{...}		AB:56AMXN_Blo
Local:3:C.InputDropMap[0]	{...}	{...}		AB:56AMXN_Blo
Local:3:C.InputDropMap[0].Block	{...}	{...}	Decimal	SINT[7]
Local:3:C.InputDropMap[0].Block[0]	1		Decimal	SINT
Local:3:C.InputDropMap[0].Block[1]	2		Decimal	SINT
Local:3:C.InputDropMap[0].Block[2]	3		Decimal	SINT
Local:3:C.InputDropMap[0].Block[3]	4		Decimal	SINT
Local:3:C.InputDropMap[0].Block[4]	5		Decimal	SINT
Local:3:C.InputDropMap[0].Block[5]	6		Decimal	SINT
Local:3:C.InputDropMap[0].Block[6]	7		Decimal	SINT
Local:3:C.InputDropMap[1]	{...}	{...}		AB:56AMXN_Blo
Local:3:C.InputDropMap[2]	{...}	{...}		AB:56AMXN_Blo
Local:3:C.InputDropMap[3]	{...}	{...}		AB:56AMXN_Blo
Local:3:C.InputDropMap[4]	{...}	{...}		AB:56AMXN_Blo
Local:3:C.InputDropMap[5]	{...}	{...}		AB:56AMXN_Blo
Local:3:C.InputDropMap[6]	{...}	{...}		AB:56AMXN_Blo
Local:3:C.InputDropMap[7]	{...}	{...}		AB:56AMXN_Blo
Local:3:C.OutputDropMap	{...}	{...}		AB:56AMXN_Blo

Figure 3 Configuration Tag

The Configuration tag consists of an InputDropMap and an OutputDropMap section. The number of entries in each section depends on the Comm Format (Master 7 Drops, Master – 14 Drops, etc.) Each entry contains 7 blocks.

You write values to each block to tell the 56AMXN which drop’s data will appear in the corresponding section of the input and output drop data tags. There is a direct correspondence between the Config tag elements and the data tag elements. For example, Local:0:C.InputDropMap[4] corresponds to Local:0:I4, etc.

The configuration tag defaults to having data from consecutive drops. For example, in the screen capture, InputDropMap[0] determines the contents of input drop data tag I0, which will contain input data from drops 1, 2, 3, 4, 5, 6 and 7.

Listen only Comm Formats have no configuration tag since they require no configuration.

The following tables show the possible values that can be written to the configuration tag.

DCS Master

InputDropMap Value	Description
0	56AMXN Status/diagnostic registers

InputDropMap Value	Description
1 to 55	Drop data from drops, registers 0 to 31
56	Unused
Any other	Invalid

OutputDropMap Value	Description
1 to 55	Drop data to remote drops, registers 32 to 63
56	Unused
Any other	Invalid

DCS Slave

InputDropMap Value	Description
0	56AMXN Status/diagnostic registers
1 to 55	Drop data, registers 32 to 63, from master
-1 to -55	Drop data, slave to master, registers 0 to 31, from monitored drops
56	Unused
Any other	Invalid

OutputDropMap Value	Description
1 to 55	Drop data, registers 0 to 31, from 56AMXN to master
56	Unused
Any other	Invalid

Duplicate entries in the InputDropMap or OutputDropMap areas are invalid. The only exception is that there can be multiple blocks marked as unused (56).

If the configuration tag contains invalid data, the connections to the 56AMXN do not open. The ControlLogix periodically retries the connections so if you correct the invalid configuration data, the connections will eventually open.

However, if you change the contents of a valid configuration tag in the ControlLogix, you must break and remake the connections to the 56AMXN to cause the 56AMXN to use the modified configuration data.

For example, you can inhibit the connection, then remove the inhibit to break and remake all connections.

I and O Tags

The I and O tags are associated with the broadcast connection. The contents vary depending on whether the 56AMXN is a DCS master or slave.

DCS Master

The I tag contains a single DINT, Fault, which is 1 if no slaves are connected and is 0 otherwise.

In addition, the fault is -1 (16#FFFF FFFF) if the connection is not active. This could be because the module is not present, is inhibited, or was configured incorrectly (wrong slot, missing or incorrect parameters, etc.)

The O tag consists of the 8 INTs of Data, the 8 words of broadcast data that the 56AMXN sends on DCSnet.

DCS Slave

The I tag consists of a single DINT, Fault, which is 1 if the master is not active on the network and is 0 otherwise, and 8 INTs of Data, the 8 words of broadcast data the master is sending on DCSnet.

In addition, the fault is -1 (16#FFFF FFFF) if the connection is not active. This could be because the module is not present, is inhibited, or was configured incorrectly (wrong slot, missing or incorrect parameters, etc.)

There is no O tag for a DCS slave.

Data Tags

Drop data appears in the I0-I7 and O0-O7 data tags. The number of tags depends on the Comm Format. Each tag consists of 7 blocks. The contents of each block are determined by the config tag.

The Input tags consist of a DINT Fault and 7 blocks of data. Each block consists of 32 INTs of drop data.

The Output tags consist of a set of blocks, each of which consists of 32 INTs of data.

For example, if the module is a DCS master in slot 7 and the Comm Format is Master – 56 drops and you write 30 to Local:7:C.InputDropMap[4].Block[1] and Local:7:C.OutputDropMap[4].Block[1], the drop data for drop 30 will appear in data tags Local:7:I4.Block[1].Data and Local:7:O4.Block[1].Data.

Input Fault Bits

The following table shows how the bits in the Fault DINT are used.

Bits	Description
0-6	Input mapped drop offline
8-14	Output mapped drop offline
16-22	Monitored mapped drop offline (slave only)

Table 3 Input Fault Bits

Global Status Registers

The 56AMXN diagnostic/status registers can be mapped into one of the input tags by writing a 0 to the entry in the Configuration tag. They may provide useful information on the operation of the network.

Registers 4-7 contain the drop status table. The module sets bits to indicate which drops are exchanging data on the network. Register 4 bit 0 corresponds to drop 0, register 4, bit 1, corresponds to drop 1, and so on.

The table shows how bits in the drop status table are handled by the 56AMXN in each mode.

Master	Slave
Bits for slave drops are set when the drops are online, and cleared if they are offline. Bit 0, corresponding to the master, is always set. If you disconnect the network, bit 0 remains set, all others go to 0.	If the 56AMXN is being scanned by a master, bits for its own active drops are set. Bits for monitored drops are set if the drops are online, and cleared if they are offline. Bit 0 is set if the 56AMXN is being scanned by a master. and is cleared otherwise. If you disconnect the network, all bits go to 0.

Table 4 Drop Status Table

Register 12 contains the 56AMXN drop number. In the DCS master, register 12 always contains 0.

Register 20 contains the 56AMXN drop depth. In the DCS master, register 20 always contains 0.

Register 14 contains a running count of messages received.

Register 15 contains receive timeouts. This counter increments when the module is waiting to receive but no message arrives within a timeout period.

Register 16 contains CRC errors. This counter increments when the module receives a packet with a bad CRC.

Register 17 contains overrun errors. This counter increments when the module receives a packet that is longer than 272 bytes.

Register 18 contains abort errors. This counter increments when the module starts to receive a packet but the packet is never completed.

Register 19 contains a running count of messages transmitted.

Offset	Description
4	Drop status, drops 0 – 15
5	Drop status, drops 16 - 31
6	Drop status, drops 32 – 47
7	Drop status, drops 48 – 55
12	56AMXN drop number
14	Messages received
15	Receive timeouts
16	CRC errors
17	Overrun errors
18	Abort errors
19	Messages transmitted
20	56AMXN drop depth

Table 5 Diagnostic Registers

For example, if you set Local:0:C.InputDropMap[4].Block[3] to 0, then Local:0:I4.Block[3].Data contains the diagnostic counters, in Local:0:I4.Block[3].Data[0] to Local:0:I4.Block[3].Data[31]

Note: You cannot map the diagnostic counters more than once.

Configuring the Module in RSLogix 5000

You configure the module in RSLogix 5000 to set the module type, how much scheduled data to transfer and how often to transfer it, and what data to transfer.

The details of the configuration depend on whether the module is being used as a DCS master or slave, or as a remote I/O master.

DCS Master or Slave

Adding the Module

To configure the module in RSLogix 5000 for use as a DCS Master or Slave, you must be offline.

1. If you are creating a new project, select File/New to create a new project, give the processor a name, and enter the slot it occupies in the ControlLogix rack.
2. Right click on I/O configuration Folder, or on the bridge module in the desired remote chassis in the I/O Configuration Folder, and select New Module...
3. Select a module of Type 56AMXN, Description DCSNet Interface from the list and Click OK. RSLogix 5000 displays the Module Properties – Local (56AMXN 2.1) dialog box.

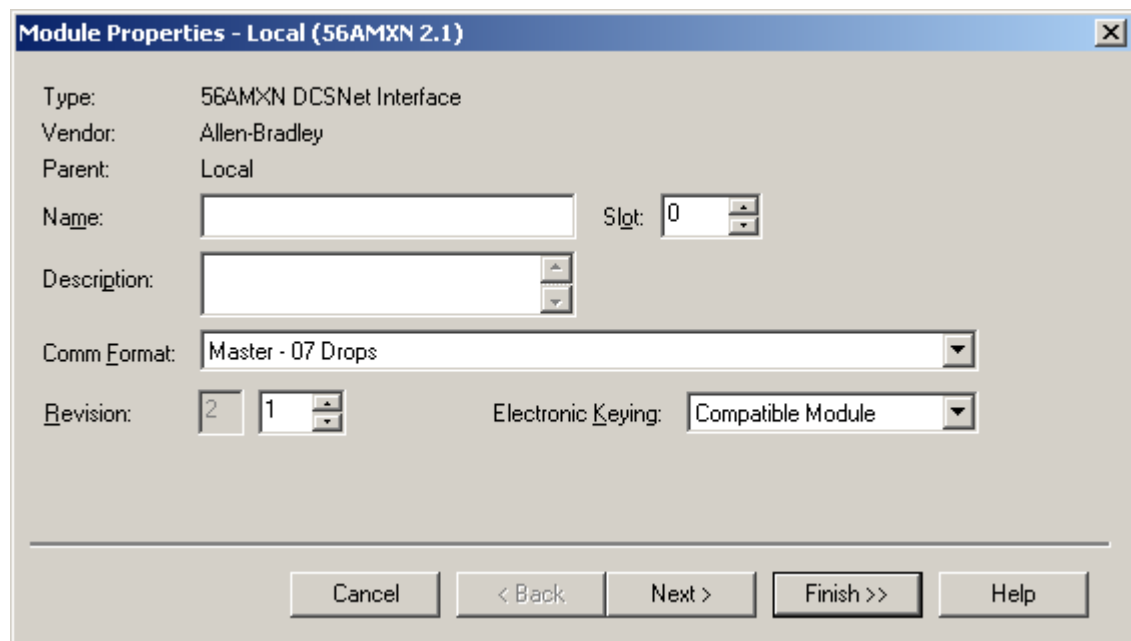


Figure 4 Module Properties Dialog 1

4. Assign the module a Name and optionally a Description.
5. Set the Slot to match the slot number of the module in the chassis.
6. Select a Comm Format from the list. Select a master or slave connection.

Choose a Comm Format that is large enough for the anticipated number of drops on the network. Too small means you can't map all the data; too large and you add extra traffic to the backplane. It's the number of drops that matters, not the drop numbers, since you map the drop data tags. For example, if the 56AMXN is a DCS master and the network contains only drops 1 and 55, these two drops can be mapped using Comm Format Master – 07 Drops by writing the appropriate values to the configuration tag for the module.

To change the Comm Format, you must delete the old module and add a new one with the required size. Any configuration data you've entered is lost when you delete the old module, so if you anticipate the DCS network will be larger in future, it's best to select a Comm Format that allows room for the data in the future network.

7. Click Next > to display the second Module Properties – Local (56AMXN 2.1) dialog box (same as the Connection Tab in Module Properties)

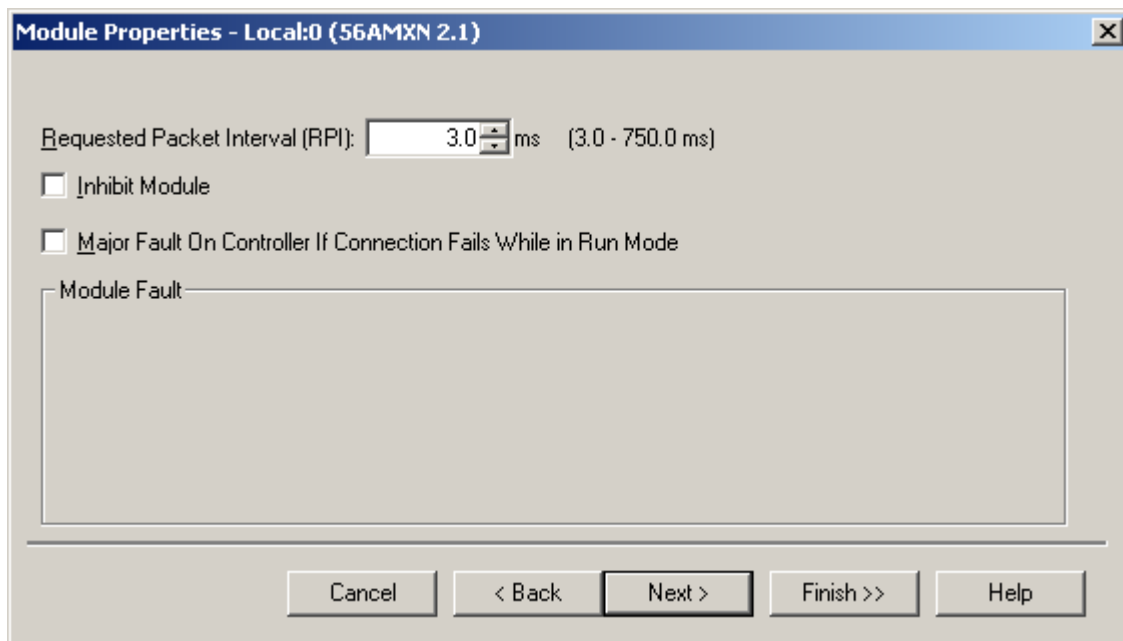


Figure 5 Module Properties Dialog 2

8. Set the module RPI. This is how often the module's scheduled data is updated in the processor. The value can range from 3.0 to 750 ms. The default is 3 ms.

The network update time is approximately 3 ms per drop (see page 68). Keep this in mind when selecting an RPI. There is no point in selecting an RPI that is much faster than the network update time since the network data will not update as fast as the RPI. In addition, it just adds to the ControlLogix backplane traffic.

9. Click Finish >> to complete the module configuration.
10. To configure the drops with which the AMXN will exchange data, expand the Configuration tag for the 56AMXN and write the config data. Refer to page 17 for possible values.
11. Save the program and download it to the ControlLogix processor.

Configuring Listen-Only Connections

In a ControlLogix system, multiple processors can receive inputs from a module. Only one processor can control the outputs.

To configure a listen only connection in RSLogix 5000, you must be offline.

1. If you are creating a new project, select File/New to create a new project, give the processor a name, and enter the slot it occupies in the ControlLogix rack.
2. Right click on I/O configuration and select New Module...

Select a module of Type 56AMXN, Description DCSNet Interface from the list and Click OK. RSLogix 5000 displays the Module Properties – Local (56AMXN 2.1) dialog box.

3. Assign the module a Name and optionally a Description.
4. Set the Slot to match the slot number of the module in the chassis.
5. Select a Comm Format from the list. Select a master or slave listen only Comm Format. Choose a Comm Format size as large as or smaller than the owning connection.

To change the Comm Format, you must delete the old module and add a new one with the required Comm Format.

6. Click Next > to display the second Module Properties – Local (56AMXN 2.1) dialog box (same as Connection Tab in Module Properties)

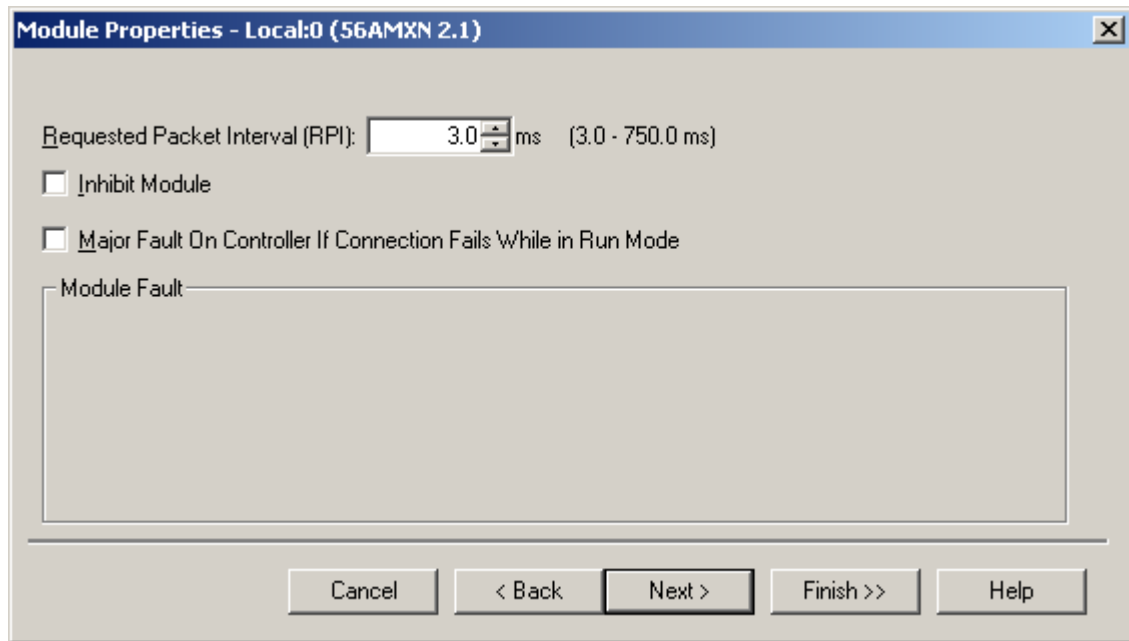


Figure 6 Module Properties 1

7. Set the module RPI. This is how often the module's scheduled data is updated in the processor. The value can range from 3.0 to 750 ms. The default is 3 ms. The listen only RPI should match the RPI for the owning ControlLogix.
8. Click Finish >> to complete the module configuration.
9. Save the program and download it to the ControlLogix processor.

Remote I/O Master

To configure the module in RSLogix 5000, you must be offline.

1. If you are creating a new project, select File/New to create a new project, give the processor a name, and enter the slot it occupies in the ControlLogix rack.
2. Right click on I/O configuration and select New Module...
3. Select a module of Type 1756-MODULE, Description Generic 1756 Module from the list and Click OK. RSLogix 5000 displays the Module Properties – Local dialog box.

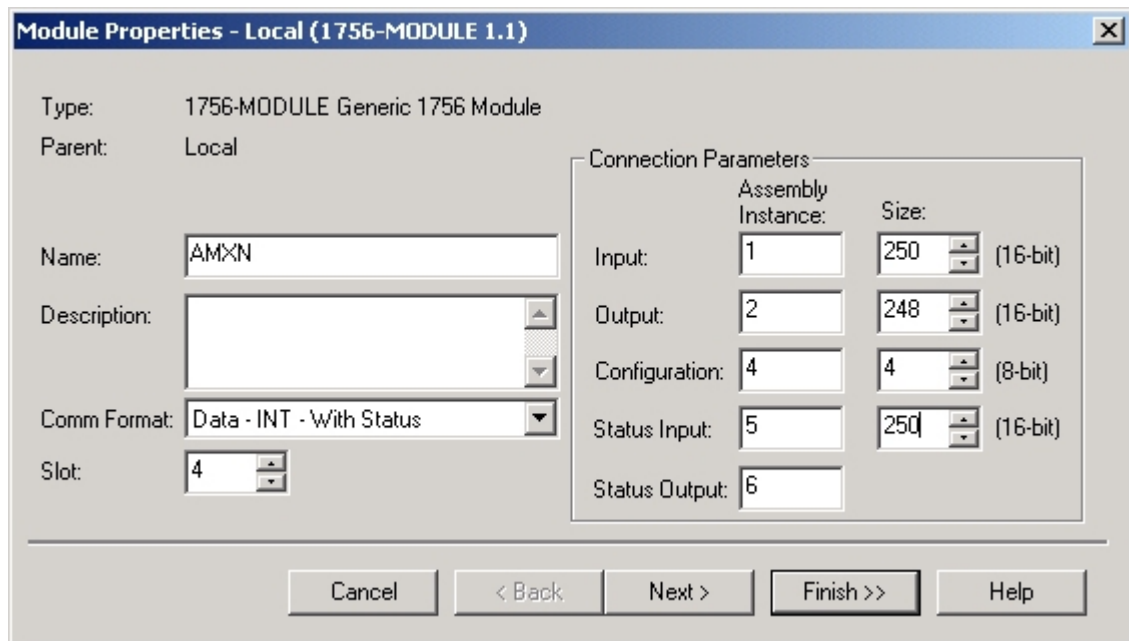


Figure 7 Module Properties Dialog 1

4. Assign the module a Name and optionally a Description.
5. Set the Comm Format to Data – INT – with Status.
6. Set the Slot to match the slot number of the module in the chassis.
7. The Input Assembly Instance should be 1. The size should be large enough to allow all the data to be passed (or larger). The maximum size is 250 words. The minimum size is determined by the largest offset assigned to input data.
8. The Output Assembly Instance should be 2. The size should be large enough to allow all the data to be passed (or larger). The maximum size is 248 words. The minimum size is determined by the largest offset assigned to output data.
9. The Configuration Assembly Instance should be 4. The size should be 4.
10. The Status Input Assembly Instance should be 5. The size should be large enough to allow all the data to be passed (or larger). The maximum size is 250 words. For Remote I/O master operation, set the size to 1.
11. The Status Output Assembly Instance should be 6. You cannot set the size.
12. Click Next > to display the second Module Properties – Local dialog box

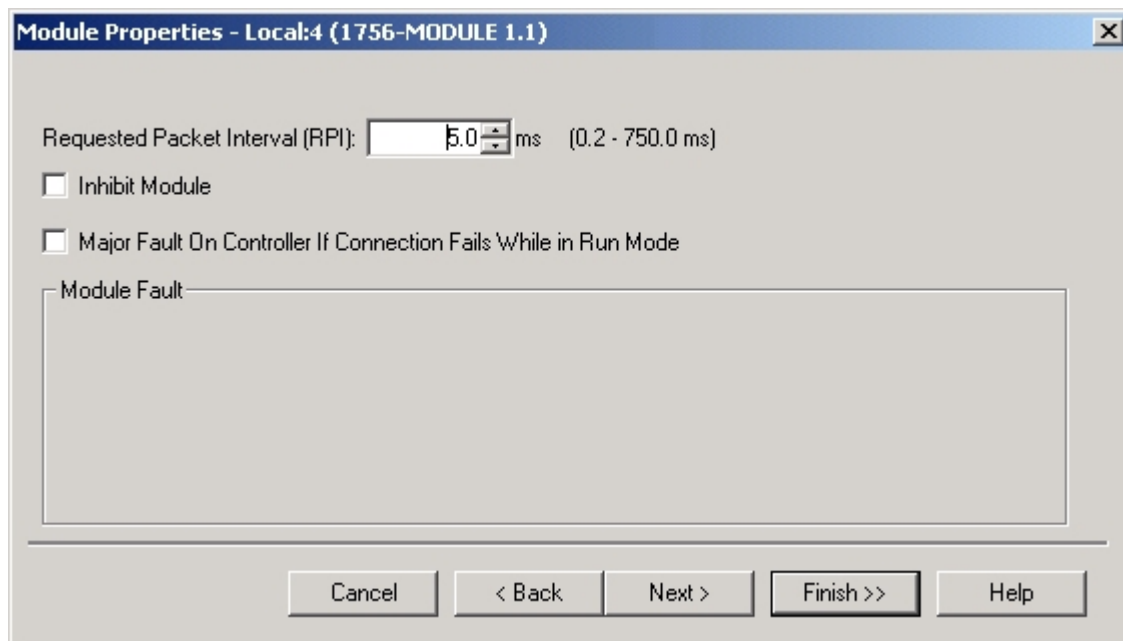


Figure 8 Module Properties Dialog 2

Connection Parameters

13. Set the module RPI. This is how often the module's scheduled data is updated in the processor. The value can range from 0.2 to 750 ms. The default is 5 ms.
14. Click Finish >> to complete the module configuration.

Using the Configuration Signature

The Remote I/O configuration program computes a configuration signature that is a CRC based on the current I/O configuration. The purpose of the configuration signature is to ensure that the remote I/O configuration stored in flash memory on the 56AMXN is the correct one. Otherwise, your ControlLogix program may be reading from or writing to incorrect locations.

You enter the configuration signature from the configuration program in the module configuration data area (Local:slot#:C:Data[0] to Local:slot#:C:Data[3]) in RSLogix 5000 to ensure that the I/O configuration on which the ControlLogix program is based matches the configuration on the module.

If the Configuration Signature in the RSLogix 5000 program doesn't match the configuration signature on the module, the module returns a key segment mismatch error to the ControlLogix when the ControlLogix processor tries to open a connection to the module.

If the connection is already open and you change the Configuration Signature in the ControlLogix Configuration data area, it has no effect

until the connection is closed and reopened, for example, by cycling power, or by removing and reinserting the module.

You can disable Configuration Signature checking by entering FF FF FF FF in the configuration data for the module in RSLogix 5000.

Refer to page 38 for information on obtaining the value to use for the configuration signature.

Importing Tags

To import the tags exported from the Remote I/O configuration program:

1. Select Tools/Import Tags...
2. Type or browse in the file name.
3. Make sure Overwrite existing tag with imported tag and Create tag if it doesn't exist are both checked.
4. Click *Import* and RSLogix 5000 imports the tags.
5. Double click on Controller Tags in the Controller Organizer tree to view the tags.

Configuring Input-Only Connections

In a ControlLogix system, multiple processors can receive inputs from a module. Only one processor can control the outputs. To configure an input-only connection to the module:

1. Right click on I/O configuration and select New Module...
2. Select a module of Type 1756-MODULE, Description Generic 1756 Module from the list and Click OK. RSLogix 5000 displays the Module Properties – Local dialog box.

Module Properties - Local:4 (1756-MODULE 1.1)

Type: 1756-MODULE Generic 1756 Module
Parent: Local

Name: AMXN
Description:
Comm Format: Input Data - INT - With Status
Slot: 4

Connection Parameters

	Assembly Instance:	Size:	
Input:	1	250	(16-bit)
Output:	3	248	
Configuration:	4	4	(8-bit)
Status Input:	5	250	(16-bit)
Status Output:	6		

Buttons: Cancel, < Back, Next >, Finish >>, Help

Figure 9 Module Properties 1

3. Assign the module a Name and optionally a Description.
4. Set the Comm Format to Input Data – INT – With Status
5. Set the Slot to match the slot number of the 56AMXN module in the chassis.
6. The Input Assembly Instance should be 1. The size should be large enough to allow all the data to be passed (or larger). The maximum size is 250 words. The minimum size is determined by the largest offset assigned to input data.
7. The Output Assembly Instance should be 3. You cannot set the size.
8. The Configuration Assembly Instance should be 4. The size should be 4.
9. The Status Input Assembly Instance should be 5. The size should be large enough to allow all the data to be passed (or larger). The maximum size is 250 words. For Remote I/O master operation, set the size to 1.
10. The Status Output Assembly Instance should be 6. You cannot set the size.
11. Click Next > to display the second Module Properties – Local dialog box.

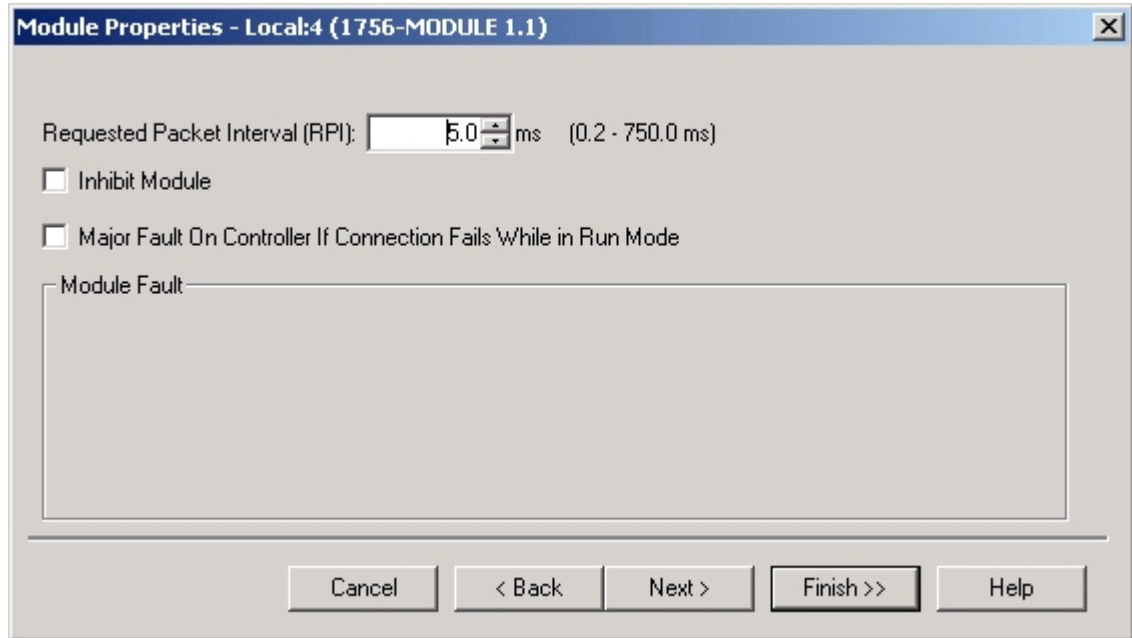


Figure 10 Module Properties 2

12. Set the module RPI. This is how often the module's scheduled data is updated in the processor. The value can range from 0.2 to 750 ms. The default is 5 ms.
13. Click Finish >> to complete the module configuration.

All connections to the module must have the same lengths and RPIs.

Using the DCS Configuration Program

The DCS Configuration program was used for the 56AMXN/A to configure the drop data mapped to scheduled data.

You do not need to use the DCS Configuration program to configure drops scanned by the 56AMXN/B. Drop configuration is done by writing to the module's Configuration tag in RSLogix 5000.

The only purpose for using the configuration program is to configure DCS bridging.

DCS Bridging

Normally the 56AMXN module gets the data it transmits for any drop from the ControlLogix output registers mapped to that drop. This is true whether the module is a DCS master or DCS slave.

The 56AMXN module also supports another method of obtaining the data it transmits. This method is called bridging. A bridged node obtains its transmit data for a drop from another 56AMXN module (and therefore usually from another AutoMax DCS network). The module from which it obtains the data is called the source module.

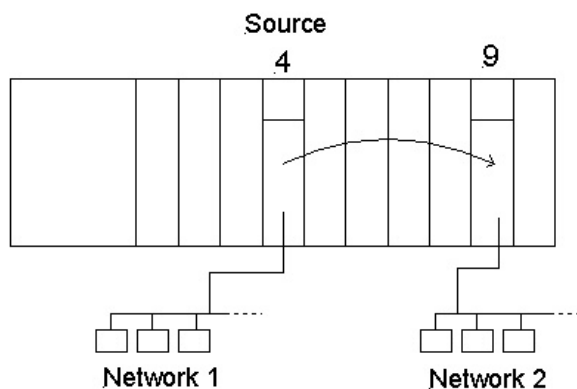


Figure 11 DCS Bridging

In the diagram, the module in slot 9 is bridged to the module in slot 4. It obtains data from Network 1 and transmits in on Network 2.

The data can come from DCS registers from any drop on the source module.

You can use bridging whether the module is a DCS master or a DCS slave.

The modules must be in the same rack.

Here's how it works... When the module is updating the drop before the bridged drop, it sends a message to the source module for the data. The reply comes back in time for the module to send out the data when it

updates the bridged drop. If the data was just about to be updated on the source, the worst case data update time is the scan time on the source module's network + 3 ms.

To configure a drop as a bridged drop:

1. Start the configuration program. From the start menu select Programs/56AMXN/56AmxnDcsCfg
2. Right click on the root of the network tree in the left pane (by default it says 56AMXN – Drop 00) and select Edit 56AMXN.

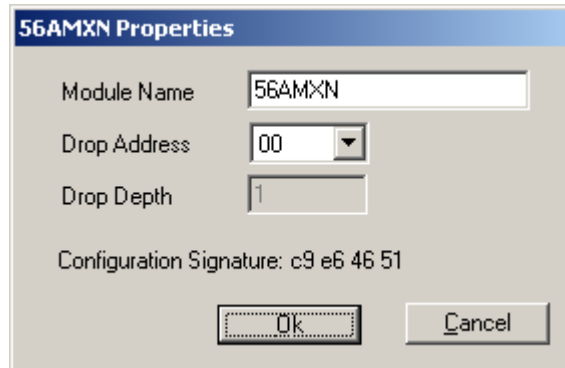


Figure 12 56AMXN Drop Number

3. Set the Drop Number and Drop Depth to match the switch settings on the 56AMXN and click OK.
4. To add drops to the 56AMXN, right click on the root of the network tree in the left pane and select Add Drop.

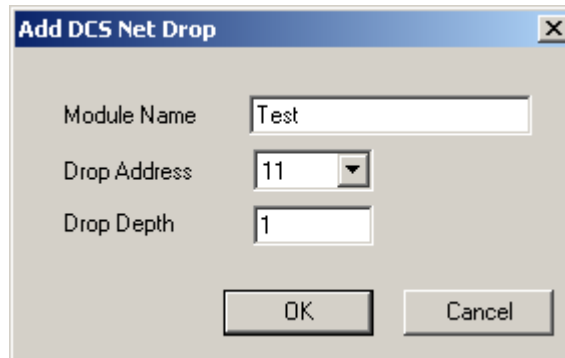


Figure 13 Adding a Drop

5. Give the drop a Module Name and set the Drop Address and Drop Depth. Click OK.
6. To make a drop a bridged drop, right click on the drop in the network tree and select Properties. The Network Node Properties dialog box opens.

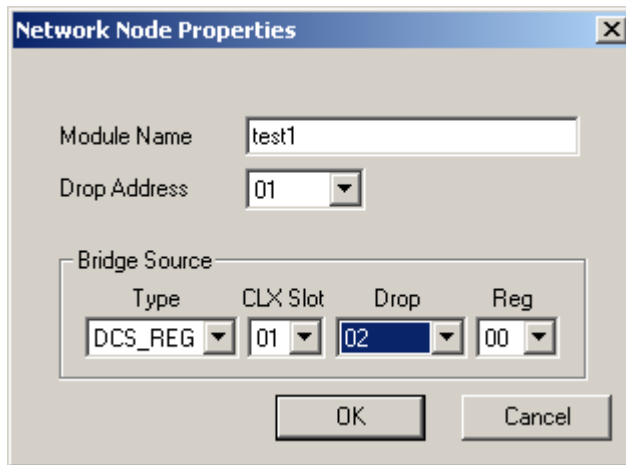


Figure 14 Bridging

7. For the Type, select DCS_REG to obtain the data from the source module's DCS registers

NOTE: the 56AMXN/B does NOT support CLX bridging.

8. Select:

- the CLX slot the source module resides in, 0-16
- the drop number of the data to be collected, 0-55
- the starting register, 00 or 32

9. Click OK.

10. To download the configuration to the 56AMXN, right click on the root of the network tree in the left pane and select Configure 56AMXN. Select the path to the 56AMXN module and click OK.

Using the 56AMXN as a Remote I/O Master

As a Remote I/O master, the module:

- Scans up to 7 drops
- Supports up to 248 words of scheduled output data and 250 words of scheduled input data
- Maintains diagnostic counters

You configure the module using the utility provided. It reads the online network and stores the network configuration in flash memory on the 56AMXN.

Subsequently, if the online network does not match the configuration in flash, the module displays an error message on the 4-character display and does not bring the mismatched drops online.

If the network changes, you must rerun the configuration program and store the new configuration in flash.

The Configuration Program

You use 56AmxnRioCfg to configure the 56AMXN ControlLogix AutoMax module as an AutoMax Remote I/O master. 56AmxnRioCfg is an online configuration tool. The 56AMXN module must be connected to the Remote I/O network to configure the module.

56AmxnRioCfg reads the network configuration and stores it to flash memory on the module. It also generates a tag file that you import into RSLogix 5000 to access the data.

Remote I/O operation assumes that all the data on the remote I/O network is data you want. Therefore there is no mapping procedure; 56AmxnRioCfg assigns locations in ControlLogix memory for all the modules it finds on the remote I/O network. If there is too much data to fit into 248 words of outputs data and 250 words of input data, you must split the network and use more than one 56AMXN module.

56AmxnRioCfg communicates with the module using RSLinx. You must have RSLinx OEM or above; you cannot use RSLinx Lite.

When you run the program, it first displays an RSWho window. Expand the tree to find the path to the 56AMXN module you wish to configure.

Procedure

1. Start 56AmxnRioCfg.
2. Select the path to the 56AMXN module in the RSWho window.
3. Select Actions/Auto Config command to read the network configuration and store it on the 56AMXN.
4. Select File/Export Tags to export the tags to a CSV file.

5. Run RSLogix 5000 and configure the module.
6. Import the tags you exported from 56AmxnRioCfg into RSLogix 5000.
7. Enter the Configuration Signature in the configuration data for the module in RSLogix 5000.

You can now write your ladder logic using the tags you imported, download the program, etc.

AutoConfiguring from the Network

When you perform an autoconfiguration, the module reads the contents of the network currently connected and stores it in flash memory on the module and displays it on the screen.

If the network changes, you must do an Autoconfiguration with the new network so that the configuration in flash matches the network. Otherwise, the module will not be able to bring mismatched drops online.

Uploading a Configuration from the 56AMXN

To upload the configuration from a running 56AMXN module in remote I/O master mode, run 56AmxnRioCfg and select Actions/Upload Config. 56AmxnRioCfg displays the network tree for the network.

The Network Tree

After you autoconfigure or upload from the module, 56AmxnRioCfg displays a tree structure that shows the drops on the network.

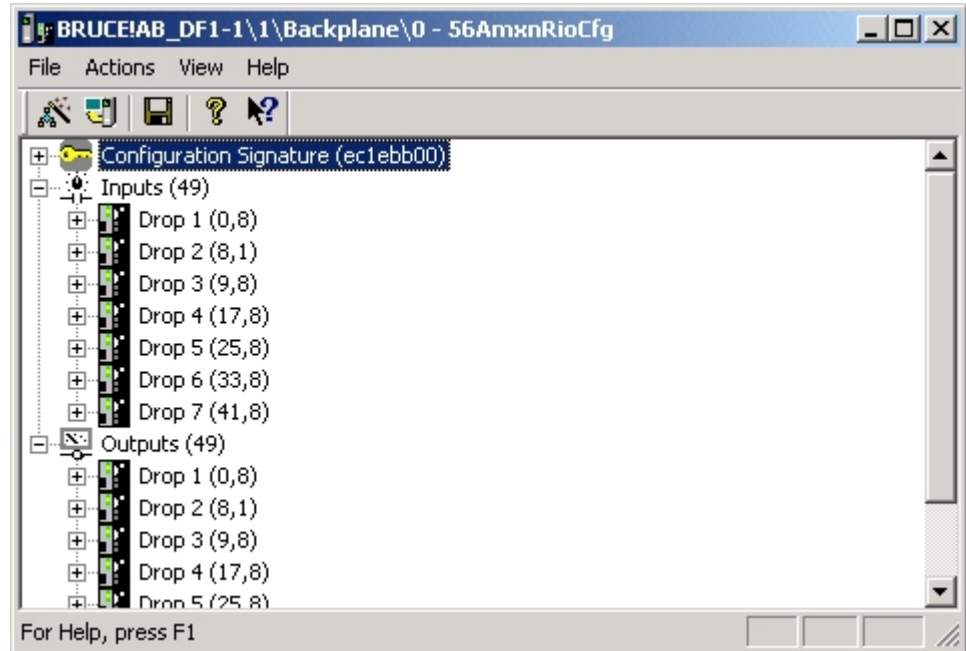


Figure 15 56AmxnRioCfg

The tree is divided into three main areas:

- The Configuration Signature
- ControlLogix Inputs
- ControlLogix Outputs

You can expand each area to show its contents.

The interpretation of the number or numbers shown after the tree elements depends on what type of element it is.

For Inputs and Outputs, the number indicates the number of registers of each type.

For Drops, the pair of numbers indicates the starting ControlLogix offset and number of registers for that drop.

For Slots, the number indicates the starting ControlLogix offset for the data for the slot.

For Registers, the number indicates the ControlLogix offset for the data for the register.

Remote I/O Tags

56AmxnRioCfg creates a tag file that consists of aliases to data locations. The format of the alias name indicates the location of the data on the remote I/O network. The format of each record is:

TYPE,SCOPE,NAME,DESCRIPTION,DATATYPE,SPECIFIER

where

TYPE	Always "ALIAS"
SCOPE	"", defaults to controller scope
NAME	the name created by 56AmxnRioCfg
DESCRIPTION	Always "" (blank)
DATATYPE	"", defaults to INT
SPECIFIER	the ControlLogix address for the data

Table 6 Remote I/O Tag Format

The format of the name is AmxRioIn_CLXslot_Drop_Slot_Register for input data or AmxRioOut_CLXslot_Drop_Slot_Register for output data.

Some examples...

```
ALIAS,"","AmxRioIn_16_06_03_022","","","Local:16:I.Data[88]"
ALIAS,"","AmxRioIn_16_06_03_023","","","Local:16:I.Data[89]"
ALIAS,"","AmxRioOut_16_01_04_16","","","Local:16:O.Data[0]"
ALIAS,"","AmxRioOut_16_01_04_17","","","Local:16:O.Data[1]"
```

The tag file is a comma-separated variable (CSV) text file. You can edit the file to change the names or add descriptions before you import the file into RSLogix 5000. Just remember that if the network changes, you will have to export and edit a new file.

The advantage of using aliases in your program is that if the network changes and 56AmxnRioCfg assigns new addresses in the ControlLogix memory, you just have to export the tags for the new network, import them into RSLogix 5000 and your program will use the correct address.

The Configuration Signature

For Remote I/O master operation, the Configuration Signature is displayed in the network tree.

Using the MSG Instruction to Access 56AMXN Data

You can use ControlLogix MSG instructions to access data in various objects on the 56AMXN module.

For example, you can access any data on the DCS network using MSG instructions to the custom DCS data object.

To use a MSG instruction, you create a tag of type MESSAGE to act as a control for the MSG instruction and source and destination tags for the MSG data. You must also enter the path to the 56AMXN module.

The screenshot shows the 'Message Configuration - message' dialog box. It has three tabs: 'Configuration*', 'Communication', and 'Tag'. The 'Configuration*' tab is active. The 'Message Type' is set to 'CIP Generic'. The 'Service Type' is 'Get Attribute Single'. The 'Source Element' is empty. The 'Source Length' is 0 Bytes. The 'Service Code' is 'e' (Hex), 'Class' is 'c4' (Hex), and 'Destination' is 'destination'. The 'Instance' is 1 and 'Attribute' is 2 (Hex). There is a 'New Tag...' button. At the bottom, there are radio buttons for 'Enable', 'Enable Waiting', 'Start', and 'Done', with 'Done Length: 0'. There are also checkboxes for 'Error Code:', 'Extended Error Code:', and 'Timed Out'. At the very bottom are 'OK', 'Cancel', 'Apply', and 'Help' buttons.

Figure 16 MSG Block Format

The tables in the following sections list the values you enter in the MSG tags to perform the various operations.

DCS Data Object

The 56AMXN module implements a custom DCS Data Object that gives you access to all the data on the DCS network. You can use MSG instructions to access the data for any drop connected to the 56AMXN module, not just the drops that have their data mapped into the scheduled data of the ControlLogix processor.

The following tables show the attributes, instances and services supported by the DCS Data Object on the 56AMXN. The combination

of service, instance, and attribute makes it possible to read or write the data on any DCS drop.

There are instructions that read and write the data on single drops and instructions that read and write data on multiple drops.

Note that these instructions allow you to write to areas of the network memory map that AutoMax would not allow.

If you read or write data that is also mapped into the scheduled data, the data read or written with the MSG instruction will be overwritten when the scheduled data updates.

Refer to the ControlLogix documentation for general information on the object model used in ControlLogix processors.

Instances

The instance is used to distinguish between registers 0-31 and registers 32-63. For example, if the MSG instruction is performing a write, it can write to only one group of registers or the other, depending on whether it is a DCS master or DCS slave.

Instance	Description
1	Registers 0-31
2	Registers 32-63

Table 7 DCS Data Object Instances

Attributes

Attributes are used to select the drop the MSG instruction is reading from or writing to.

Attribute	Description
1-55	Selects the drop number. Note that you enter the attribute in hex in RSLogix 5000

Table 8 DCS Data Object Instance Attributes

Instance Services

The DCS Data Object supports the following services, which are described in more detail in the sections which follow.

Service (hex)	Name	Function
03h	Get Attribute List	Get the data for up to 7 drops

Service (hex)	Name	Function
04h	Set Attribute List	Set the data for up to 7 drops
0eh	Get Attribute Single	Get the data for a single drop
10h	Set Attribute Single	Set the data for a single drop
32h	DCS Register Raw Write	Write a block of data to the DCS registers on the 56AMXN
33h	DCS Register Raw Read	Read a block of data from the DCS registers on the 56AMXN
36h	Write Multiple Drops	Set the data for up to 7 drops
37h	Read Multiple Drops	Get the data for up to 7 drops

Table 9 DCS Data Object Instance Services

Instance Level Services

You use instance level services to read and write register data on DCS drops. Which data you can write depends on whether the module is a DCS master or slave.

Get Attribute Single, Service Code 0Eh

Note: for best performance, we recommend you use the Read Multiple Drops command (page 48), especially if you are reading the data for more than one drop.

To read the instance level attributes for a single attribute (drop), enter the following parameters in the MSG instruction tags:

Message Type	CIP generic
Service Type	Get Attribute Single
Service Code	0Eh (grayed out)
Class (hex)	C4h
Instance	1 for registers 0-31 2 for registers 32-63
Attribute (hex)	Corresponds to the drop number, range 0-55. Note that you enter the attribute in hex in RSLogix 5000
Source Element	(grayed out)
Source	(grayed out)

Length (bytes)	
Destination	Enter the destination tag name, must be large enough to hold the data, make it an integer array of size at least 32 integers

Table 10 DCS Data Object Instance Level Get Attribute Single Parameters

This command can be used to read the DCS data for any drop, including drop 0. You enter the drop number as the attribute, and use the instance to select whether you want to read registers 0-31 or 32-63.

The command returns the data in 32 consecutive integers in the destination tag.

Set Attribute Single, Service Code 10h

Note: for best performance, we recommend you use the Write Multiple Drops command (page 50), especially if you are writing the data for more than one drop.

To set the instance level attributes for a single attribute (drop), enter the following parameters in the MSG instruction tags:

Message Type	CIP generic
Service Type	Set Attribute Single
Service Code	10h (grayed out)
Class (hex)	C4h
Instance	1 for registers 0-31 2 for registers 32-63
Attribute (hex)	Corresponds to the drop number, range 0-55. Note that you enter the attribute in hex in RSLogix 5000
Source Element	Enter source tag, make it an integer array of size at least 32 integers
Source Length (bytes)	64 (bytes), but see below for attribute 0
Destination	(grayed out)

Table 11 DCS Data Object Instance Level Set Attribute Single Parameters

This command can be used to write the DCS data for any drop, including drop 0. You enter the drop number as the attribute, and use the instance to select whether you want to write to registers 0-31 or 32-63. Normally

you would write to registers 0-31 as a DCS slave and to registers 32-63 as a DCS master.

The length for attribute 0 is a special case.

For instance 1, the size must be 12 (6 words). The command writes to registers 14-19, the diagnostic counters. For example, you could use this command to clear diagnostic counters.

For instance 2, the size must be 16 (8 words). The command writes to the broadcast registers (32-39). Normally you would do this only as a DCS master.

If you write to a register that is also mapped as scheduled data, the values written by the MSG instruction will be overwritten when the scheduled data updates.

Get Attribute List, Service Code 3

Get Attribute List is a standard ControlNet service that lets you read more than one attribute (drop) with a single message. The 56AMXN also supports a custom service, Read Multiple Drops (see page 48) that performs the same function but which has a parameter format that makes it easier to locate DCS network data.

We recommend that applications use Read Multiple Drops rather than Get Attribute List.

To use Get Attribute List to read the instance level attributes for more than one attribute (drop), enter the following parameters in the MSG instruction tags:

Message Type	CIP generic
Service Type	Custom
Service Code	3
Class (hex)	C4h
Instance	1 for registers 0-31 2 for registers 32-63
Attribute (hex)	leave blank
Source Element	Enter the source tag name
Source Length (bytes)	2 + Num of attributes (drops) * 2
Destination	Enter destination tag name

Table 12 DCS Data Object Instance Level Get Attribute List Parameters

In the source tag, the data consists of:

of attributes

First Attribute #

Second attribute #

And so on.

The reply consists of:

of attributes

First Attr #

Status for first attribute

Data[32] for first attribute

Second Attr #

Status for second attribute

Data[32] for second attribute

and so on.

The attribute status reflects the status of the drop in the active drop list. The value if the drop status bit for this drop is 0 (not present) or 1 if the drop status bit for this drop is 1 (present).

The number of attributes whose data you can read at one time is limited by the maximum message length of approximately 500 bytes, which corresponds to a maximum of 7 attributes (drops).

Example

For example, to read registers 0-31 on drops 1, 4 and 7, set up a MSG instruction with the following parameters:

Message Type	CIP generic
Service Type	Custom
Service Code	3
Class (hex)	C4h
Instance	1
Attribute (hex)	Leave blank
Source Element	Source tag name
Source	$2 + 3 * 2 = 8$

Length (bytes)	
Destination	Destination tag name

Table 13 Get Attribute List Example

In the source tag, an array of at least 4 integers, we would enter:

3 (number of attributes)

1 (first attribute)

4 (second attribute)

7 (third attribute)

The reply written to the destination tag would consist of:

3 (number of attributes)

1 (status of first attribute, drop 1)

32 integers of data for drop 1

1 (status of second attribute, drop 4)

32 integers of data for drop 4

1 (status of third attribute, drop 7)

32 integers of data for drop 7

Set Attribute List, Service Code 4

Set Attribute List is a standard ControlNet service that lets you read write the data for more than one attribute (drop) with a single message. The 56AMXN also supports a custom service, Write Multiple Drops (see page 50) that performs the same function but which has a parameter format that makes it easier to locate DCS network data.

We recommend that applications use Write Multiple Drops rather than Set Attribute List.

To use Set Attribute List to write the instance level attributes for more than one attribute (drop), enter the following parameters in the MSG instruction tags:

Message Type	CIP generic
Service Type	Custom
Service Code	4
Class (hex)	C4h

Instance	1 for registers 0-31 2 for registers 32-63
Attribute (hex)	leave blank
Source Element	enter source tag name
Source Length (bytes)	2 + [number of attributes] * 66, see table below
Destination	enter destination tag name, it doesn't matter but it must be entered.

Table 14 DCS Data Object Instance Level Set Attribute List Parameters

Message format in the source tag

of attributes

First Attribute #

Data[32]

Second attribute #

Data[32]

etc

Number of Attributes	Length	Element number for Attr number
1	68	1
2	134	34
3	200	67
4	266	100
5	332	133
6	398	166
7	464	199

Table 15 Set Attribute List – Length and Location

If one of the attributes in the list is 0, the values in the table don't apply. Attribute 0 is a special case for lengths.

For instance 1, the size must be 12 (6 words). The command writes to registers 14-19, the diagnostic counters. For example, you could use this command to clear diagnostic counters.

For instance 2, the size must be 16 (8 words). The command writes to the broadcast registers (32-39). Normally you would do this only as a DCS master.

The maximum message size limits the number of attributes you can write in a single message to 7.

DCS Raw Write, Service Code 32h

The DCS raw write command can be used to write a block of data to the DCS data area on the module. You tell it the starting offset and the data length and it writes the data. This is a very powerful command, use it carefully!

Enter the following parameters in the MSG instruction tags:

Message Type	CIP generic
Service Type	Custom
Service Code	32h
Class (hex)	C4h
Instance	1
Attribute (hex)	Leave blank
Source Element	Enter source tag
Source Length (bytes)	2 + length of data in words * 2, max 480 (max data length = 239)
Destination	Enter destination tag name, not used but must be entered

Table 16 DCS Data Object DCS Raw Write Parameters

In the source tag

First word	offset in words = drop * 64 + register, range is 0 to 55 * 64 + 63 = 3583
Remaining words	Data[...]

The module checks that the offset is in range and that the combination of offset and length is in range. If this is not true, it returns an error.

DCS Raw Read, Service Code 33h

The DCS raw read command can be used to read a block of data from the DCS data area on the module. You tell it the starting offset and the data length and it reads the data.

Enter the following parameters in the MSG instruction tags:

Message Type	CIP generic
Service Type	Custom
Service Code	33h
Class (hex)	C4h
Instance	1
Attribute (hex)	Leave blank
Source Element	Enter source tag name
Source Length (bytes)	4 (offset + length)
Destination	Enter destination tag name, must be large enough to hold the data

Table 17 DCS Data Object DCS Raw Read Parameters

In the source tag

First word	offset in words = drop * 64 + register, range is 0 to 55 * 64 + 63 = 3583
Second word	Length in words, 1 to 230

Read Multiple Drops, Service Code 37h

This command is similar in purpose to Get Attribute List, except that the layout of the data is more intuitive and makes it easier to locate the data for a specific drop and register. The format for Get Attribute List is set by the ControlNet specification and can't be changed.

Read Multiple Drops does not support drop 0.

Enter the following parameters in the MSG instruction tags:

Message Type	CIP generic
Service Type	Custom
Service Code	37h
Class (hex)	C4h
Instance	1 for registers 0-31 (master or slave) 2 for registers 32-63 (master or slave)
Attribute (hex)	leave blank
Source Element	enter source tag name
Source Length (bytes)	2 + Number of drops * 2
Destination	enter destination tag name

Table 18 Read Multiple Drops Parameters

Message format in the source tag

of drop

First drop #

Second drop #

...

Last drop #

The Reply data consists of

Data for the first drop, 32 words

Data for the second drop, 32 words

...

Data for the last drop, 32 words

up to a maximum of 7 drops

Number of drops	Minimum destination size, INTs
1	32
2	64
3	96

4	128
5	160
6	192
7	224

If you create an array organized as Data[number of drops][32] to hold the returned data, it makes it very easy to locate the data for each drop and register.

Write Multiple Drops, Service Code 36h

This command is similar in purpose to Set Attribute List, except that the layout of the data is more intuitive and makes it easier to locate the data for a specific drop and register. The format for Set Attribute List is set by the ControlNet specification and can't be changed.

If you write data that is also mapped as scheduled data, the data you write will be overwritten when the next scheduled data update occurs.

Enter the following parameters in the MSG instruction tags:

Message Type	CIP generic
Service Type	Custom
Service Code	36h
Class (hex)	C4h
Instance	1 for registers 0-31 (slave) 2 for registers 32-63 (master)
Attribute (hex)	leave blank
Source Element	enter source tag name
Source Length (bytes)	2 + [number of drops] * 66, see table below
Destination	enter destination tag name, not used but must be entered

Table 19 Write Multiple Drops Parameters

Message format in the source tag:

Data for the first drop in the list, 32 words

Data for the second drop in the list, 32 words

...

Data for the first drop in the list, 32 words

of drops

First Drop #

Second drop #

...

Last drop #

with up to 7 attributes and data arrays

Note that Write Multiple Drops does not support drop 0

Drops	Source Length (bytes)
1	68
2	134
3	200
4	266
5	332
6	398
7	464

Nothing is written to the destination tag.

If you create a source tag as an array of dimensions Data[number of drops + 1][32], it makes it very easy to locate the data for each drop and register.

Remember that if you change the number of drops you are writing, you must change the Source Length (bytes) in the MSG instruction and also the location in the array where you write the number of drops and the drop numbers.

Example

An application writes data for drops 1, 4, and 7.

Create a source array of name and size Data[4][32]. In Data [4][0] to Data[4][3] write the values 3, 1, 4, 7 (number of drops, and the drop numbers). Put the data for drop 1 in Data[0][0] to Data[0][31], the data for drop 4 in Data[1][0] to Data[1][31], and the data for drop 7 in Data[2][0] to Data[2][31].

Create a MSG instruction using the service code, class, instance and attribute described above. For the source, enter the tag name Data. For the Source Length (bytes), enter 200 (from the table, we're writing 3 drops). Enter a tagname for the destination. Finally, on the Connection tab, type or browse the path to the 56AMXN module.

Using DDE/OPC to Access DCS Data on the Module

You can use a DDE or OPC server such as RSLinx, or any other HMI capable of accessing the ControlLogix backplane, to access the DCS data directly on the 56AMXN. The module “emulates” PLC-5 integer files 100-155. Each file corresponds to a DCS drop. For example, if you create tags to access N102, N102:0 to N102:63 represent Drop 2’s DCS registers.

The 56AMXN supports Word Range Read/Write, Typed Read/Write, Read/Modify/Write, and PLC-3 Bit Write messages, with either logical ASCII or logical binary addressing.

To configure a topic in RSLinx to access data on the 56AMXN:

1. Create a new topic. From the main menu select DDE/OPC/Topic Configuration. Click New and give the topic a name.
2. Select the Data Source tab, browse the path to the 56AMXN module and click Apply.
3. On the Data Collection tab, set the Processor Type to PLC-5. Check Polled Messages and select an appropriate update rate. Leave everything else unchecked. Click Apply
4. You do not need to set anything on the Advanced Communication tab.
5. Click Done to complete the topic configuration.

You should now be able to access data using any client capable of communicating with RSLinx.

If you write to a register that is also mapped to ControlLogix scheduled data, the value you write will be overwritten when the next scheduled data update occurs.

Using the Monitor Program

56AmxnMon is a program that lets you monitor the operation of the 56AMXN ControlLogix AutoMax module and perform maintenance operations.

56AmxnMon displays:

- the DCS active station list
- the standard DCS diagnostic counters
- ControlLogix backplane diagnostic counters
- raw DCS registers for any drop
- raw ControlLogix input, output and status data (56AMXN/A only)

In addition, it can be used to:

- display the debug log, which consists of messages from the firmware running on the module
- clear the debug log
- copy the contents of the debug log to the clipboard for use by another application. This is often useful for technical support
- clear fatal errors and dump the fatal error log to a file for use by technical support

Monitoring DCS Registers

Select Monitor/DcsRegs to monitor the AutoMax DCS registers on any drop.

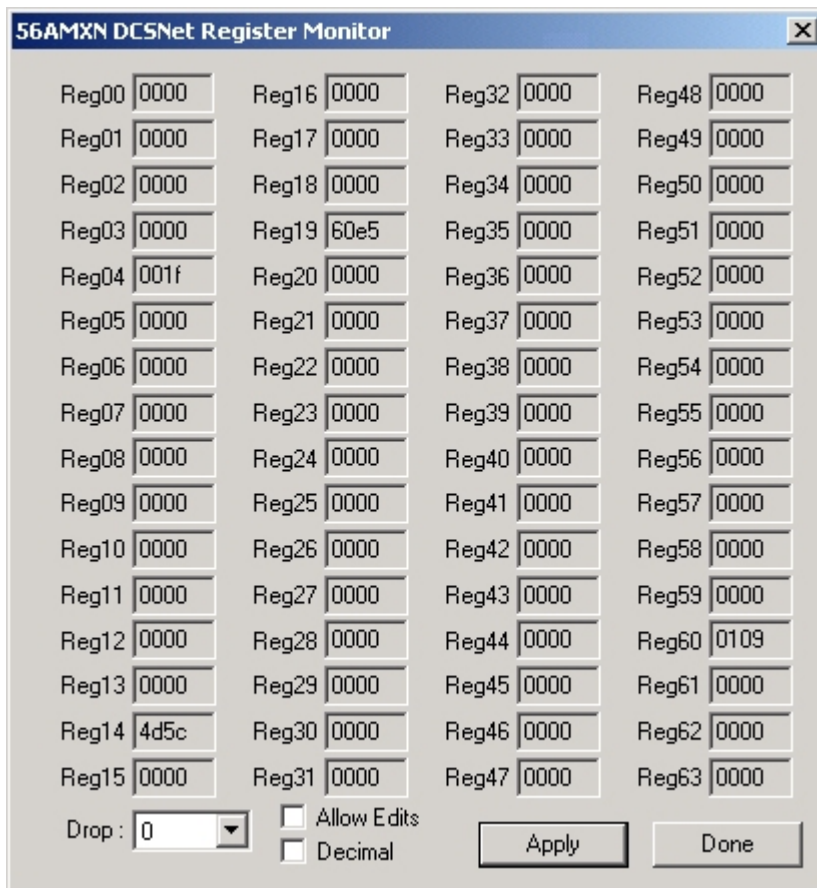


Figure 17 DCS Register Display

Use the *Drop* listbox to select the drop number to display.

For drops 1-55, registers 0-31 contain the data from the slave to the master. Registers 32-63 contain the data from the master to the slave.

WARNING! If you change values in the DCS registers, the values on the module will change. Consider the consequences of changing data on the DCS network.

You can use 56AmxnMon to change values in DCS registers. Before you can do this, you must check Allow Edits. You will be asked to confirm this. If you change values for data that is mapped into ControlLogix scheduled data, the value you write will be overwritten when the next scheduled data update occurs.

By default the register contents are shown in decimal. Uncheck *Decimal* to display the register contents in hexadecimal.

DCS registers apply only to DCS master and slave operation. If you attempt to monitor DCS registers when the module is configured for remote I/O operation, 56AmxnMon returns an error.

DCS data can also be displayed in RSLogix 5000 using Monitor Tags to display the appropriate tags.

Monitoring CLX Registers

This function is used only with the 56AMXN/A.

Select Monitor/ClxRegs to display the scheduled data the module is exchanging with the ControlLogix processor in the ControlLogix Input, Output and Status tables.

You can use this command to monitor the ControlLogix data in both DCS and Remote I/O operation.

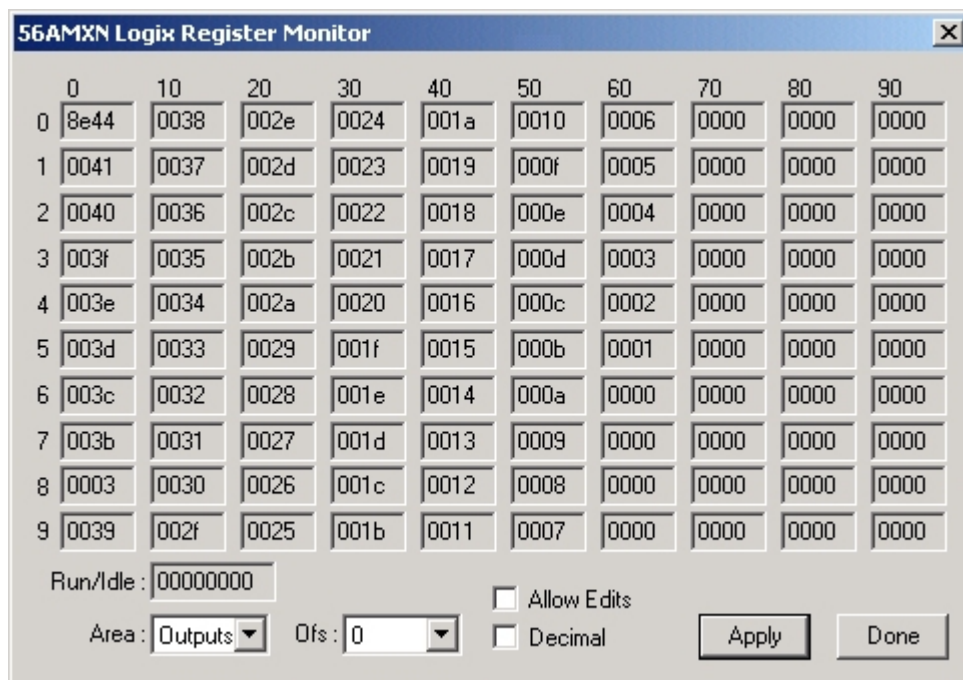


Figure 18 CLX Register Display

Select Inputs, Outputs or Status from the *Area* listbox.

Each area contains 256 registers. The dialog displays 100 registers at a time. Select which group of 100 registers you want using the *Ofs* list box.

Each column displays 10 consecutive registers.

By default the contents of the registers are shown in decimal. You can display the contents in hexadecimal by unchecking the *Decimal* checkbox.

WARNING! If you change values in the CLX registers, the values on the module will change. Consider the consequences of changing the data.

You can use 56AmxnMon to change values in CLX registers. Before you can do this, you must check Allow Edits. You will be asked to confirm this. If you change values for data that is mapped into ControlLogix scheduled data, the value you write will be overwritten when the next scheduled data update occurs.

Monitor Diagnostics

Select Monitor/Diagnostics to display:

- AutoMax Diagnostic counters
- ControlLogix Backplane Diagnostic Counters
- The Active Drop List

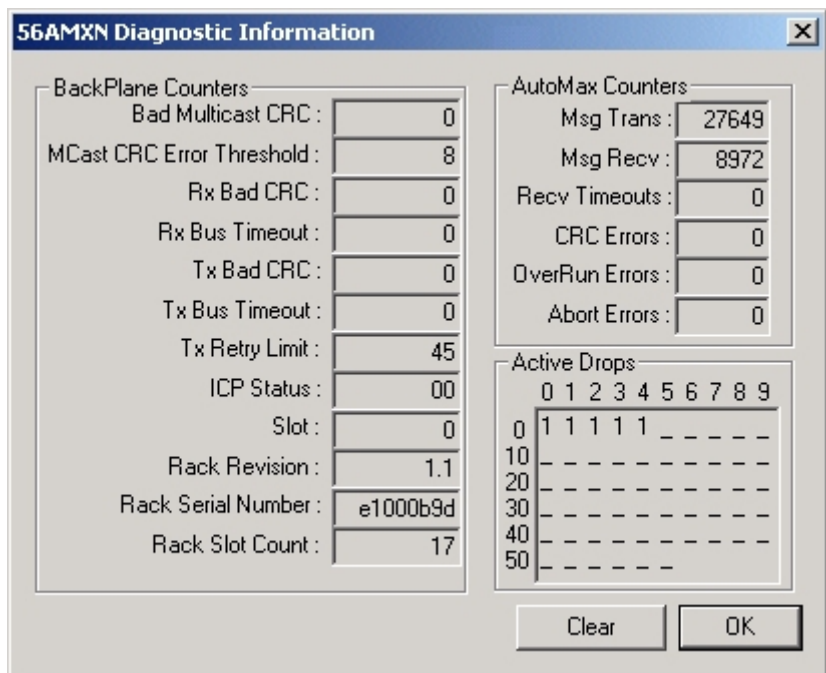


Figure 19 Diagnostic Information Display

AutoMax Diagnostic Counters

The AutoMax Diagnostic Counters include:

- Msg Trans, counts packets successfully transmitted by the module

- Msg Recv, counts packets successfully received by the module
- Recv Timeouts, applies only when the module is the DCS master. They occur when a reply packet isn't received within the timeout period.
- CRC Errors, counts packets received with CRC errors
- OverRun Errors, counts packets received that are longer than 272 bytes
- Abort Errors, increments when the module starts to receive a packet but the packet is never completed, for whatever reason

AutoMax Diagnostic counters apply to both DCS and Remote I/O operation.

ControlLogix Backplane Diagnostic Counters

The ControlLogix Backplane Counters include:

Counter	Description
Bad Multicast CRC	the number of multicast receive CRC errors since the last power-on or reset
Mcast CRC Error Threshold	the threshold for entering fault state due to multicast CRC errors, can be set in RSLogix 5000
Rx Bad CRC	the number of directed receiver CRC errors since the last power on or reset
Rx Rx Bus Timeout	the number of receiver bus timeouts since the last power on or reset
Tx Bad CRC	the number of transmitter bus timeouts since the last power on or reset
Tx Bus Timeout	the number of transmit bus timeouts since the last power on or reset
Tx Retry Limit	number of times to retry a frame if a transmit error occurs
ICP Status	current status of the ICP object on the module
Slot	the module's rack and slot address
Rack Revision	revision of the primary rack
Rack Serial Number	serial number of the primary rack
Rack Slot Count	number of slots in the primary rack

Table 20 Backplane Diagnostic Counters

AutoMax Diagnostic counters apply to both DCS and Remote I/O operation.

Active Drop List

The Active Drop List shows which DCS drops are active on the network. For Remote I/O operation, only drops 1-7 are valid.

The Debug Log

The firmware on the module sends trace messages that indicate its internal state of operation and show any minor errors it encounters. These messages are often useful for determining why connections have errors or for technical support.

To display these messages, select View/Monitor Debug Log. The messages will be displayed in the main 56AmxnMon window.

To clear the log, select Monitor/Clear Debug Log.

To copy the contents of the Debug Log to the Windows clipboard so that they can be pasted into another application, select Edit/Select All and Copy.

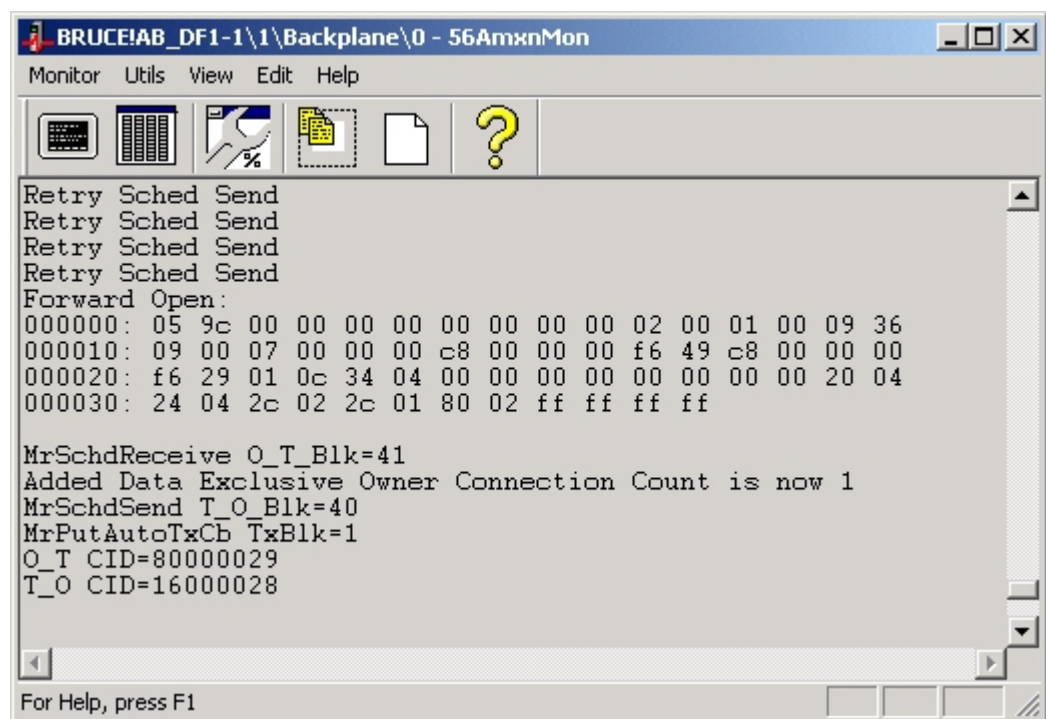


Figure 20 Debug Log

The Copy Table

The Copy Table applies only to the 56AMXN/A and not to the 56AMXN/B.

Fatal Errors

Fatal errors occur when the firmware on the module encounters an unexpected condition. The module stops scanning, turns all three LEDs red, displays the fatal error number on the 4-character display, and stores a fatal error log that indicates the cause of the fatal error.

To clear the fatal error and capture the fatal error log:

1. Cycle power on the module. The 4-character display should show "FatalErrorCapture required".
2. Run 56AmxnMon and select the Utils/Fatal Error Capture menu item.
3. Store the fatal error log to a file. This also clears the fatal error on the module.

Contact technical support. Provide them with the fatal error log, which will help diagnose the cause of the problem.

Troubleshooting

LEDs

The 56AMXN module has three LEDs that indicate the state of the network connection, the connection to the ControlLogix processor, and the overall module health. These LEDs can be used in conjunction with the 4-character scrolling display and the monitor program 56AmxnMon to determine the cause of the problem.

NET LED – DCS/RIO Network Status

The NET LED indicates the status of the network connection. It is green if the network status is good. If it is red, the following table shows possible causes.

Operating Mode	Meaning
DCS Slave	Red if no master is heard or Active or Monitored drops go offline (1 sec)
DCS Master	Red if no Drops are found or if a Drop goes offline (1 sec)
RIO Master	Red if not all drops in configuration are active, or if extra drops are found or any other configuration mismatch exists

Table 21 NET LED

CLX LED – ControlBus Status

The CLX LED indicates the status of communication with the ControlLogix processor.

Color	Meaning
Red	The module has returned an error, received an error or refused a connection from the backplane. Start 56AmxnMon and display the debug log to determine the cause.
Orange	No errors, but no activity
Green	An active connection is open or Bridging is active or DCS registers are being accessed

Table 22 CLX LED

OK LED – Module Health

A bicolor OK LED indicates module health. A red LED indicates that module startup diagnostics have failed or a major module fault such as watchdog timeout or jabber inhibit has occurred. Green indicates that the card has passed all power-up diagnostics and is functioning normally. This LED is red during powerup.

All LEDs Red

If all three LEDs are solid red and the 4-character display shows something like M#66, this indicates that a fatal error has occurred. Refer to page 60 for information on clearing fatal errors. If a fatal error occurs, clear the fatal error, save the file and contact Technical Support.

4-Character Display

The following messages may be displayed on the 4-character scrolling display.

Message	Description
56AMXN Ver x.xx.xx	The module's firmware version, displayed at powerup.
Error: Heard Another DCS Master	The module is configured as a DCS master and has heard another DCS master on the network.
DCS Master	The module is a DCS master. Displayed during normal operation.
Drop xx OffLine	DCS drop xx has gone offline.
DCS Slave Invalid Depth 0	The drop number switches are set for a drop number from 1 to 55 but the drop depth switches are set to 0.
DCS Slave Drop+Depth 'xx' Too High	The combination of drop number and drop depth results in invalid drop numbers (>55). Check the switch settings.
DCS Slave Drop=xx Depth=xx Waiting...	The module is configured as a DCS slave with the drop number and depth displayed, but is not currently being scanned by a DCS master.
Error: Heard Duplicate DCS Slave Drop xx	The module is configured as a DCS slave and has heard a drop on the network with a drop number that overlaps one of its active drops.
DCS Slave Drop=xx	The module is configured as a DCS slave, with

Message	Description
Depth=xx	the drop number and drop depth shown. Displayed during normal operation.
Drop xx Timeout	DCS drop xx has timed out.
Mon Drop xx Timeout	Monitored DCS drop xx has timed out.
Firmware Update...	The firmware on the module is being updated.
Error: Heard Another RIO Master	The module is configured as a Remote I/O master and has heard another Remote I/O master active on the network.
RIO Master	The module is configured as a Remote I/O master. Displayed during normal operation.
Drop x Config Mismatch	The configuration for remote I/O drop x in Flash memory on the module doesn't match the drop on the network.
Drop x OffLine	Remote I/O drop x is offline.
RIO FLASH Config Invalid	The module is configured as a Remote I/O master and the configuration in FLASH memory is invalid. Run 56AmxnRioCfg and configure the module.
Flash Config Drop Mismatch	Configuration in FLASH is incompatible with current switch settings
Thumb Test Mode	The module is in thumbwheel test mode. Refer to page 10 for more information.

Table 23 4-Character Display

Messages are displayed twice, immediately after the error occurs. To see the message again, cycle power. To determine the cause of the problem, run 56AmxnMon and display the Debug Log.

Using 56AmxnMon for Troubleshooting

The program 56AmxnMon, described in detail on page 54, can be used to troubleshoot the 56AMXN module.

If the ControlLogix processor has problems connecting to the module, RSLogix 5000 shows a yellow triangle above the module in the I/O Configuration. The module properties Connection Tab also provides some information as to why the connection failed. For more details, run 56AmxnMon and display the Debug Log. It will show the connection attempt and the reason the 56AMXN rejected the connection.

If a network error occurs, information will be logged to the Debug Log.

You can use 56AmxnMon to display the active drop list and the diagnostic counters for both DCS and RIO network communication, and diagnostic counters for the backplane communication with the ControlLogix processor.

To troubleshoot problems with DCS data, you can use 56AmxnMon to view the raw DCS data coming in to the module from the network for being sent to the network.

Reading Diagnostic Counters into the ControlLogix Program

For DCS Master or Slave operation, you can map diagnostic counters into an input data tag. Refer to page 17 for details on how to do this.

You can also use a MSG instruction to read the AutoMax diagnostic counters into your ControlLogix program.

Use an instance level get attribute single to read data from instance 1, attribute 0 of the DCS Data object. Refer to page 41 for information on how to do this.

Using RSLogix 5000 to Diagnose Problems

You display the Module Properties dialog by right clicking on the module while online with RSLogix 5000. This may help diagnosing some problems, especially connection errors.

The following information is based on version 12.00 of RSLogix 5000.

General Tab

The Type should be 56AMXN DCSNet Interface.

The Vendor should be Allen-Bradley.

The Name is whatever you set when you configured the module.

The description is whatever you set when you configured the module.

Comm Format and Slot should match what you set when you configured the module.

Connection Tab

The *Inhibit Module* checkbox inhibits the module. It should not be checked for normal operation.

The *Major Fault on Controller if Connection Fails While in Run Mode* checkbox causes the module to fault the processor if the connection between the ControlLogix processor and the module fails.

If there are any problems connecting to the 56AMXN module, there will be an error message in the module fault area. For example, if the

56AMXN refuses a connection from the processor, an error will be displayed

Value	Description and possible cause
16#000C	Service request error: Invalid mode or state for service request. The 56AMXN is unable to process the request in the current mode
16#0009	Module configuration rejected. Parameter error. Invalid or duplicate data in Configuration tag InputDropMap or Output DropMap
16#0119	Connection request: Module not owned Listen only Comm Format with no corresponding owner
16#0111	Requested packet interval (RPI) out of range Invalid RPI value or listen only RPI doesn't match owner RPI

Table 24 Connection Errors

For remote I/O operation, if the error indicates that there is a key signature mismatch, check that the Configuration Signature in the RSLogix 5000 program has the correct value, or is FF FF FF FF to disable Configuration Signature checking.

The Inhibit Module checkbox can be used to break and re-establish connections to the module. For example, it can be used in DCS master or slave operation to force a reconfiguration after changing the configuration tag. To break the connection, check Inhibit Module and click Apply. To re-establish the connection, clear the Inhibit Module checkbox and click Apply.

Module Info Tab

The vendor should be Allen-Bradley.

The Product Type should be Communications Adapter.

The Product Code should be 56AMXN.

The revision should be 2.1

The Serial number should match the serial number on the module.

The Product Name should be 56AMXN.

The **Status section** contains information about the connection status, including:

- Major fault

- Minor fault
- Internal state
- Configured
- Owned
- Module Identity

The Refresh Button updates the information on the screen.

Backplane Tab

The ControlBus Status shows any backplane faults, or OK if there are no faults.

ControlBus Parameters

The Multicast CRC error threshold is fixed at 8.

The Transmit Retry Limit defaults to 45 but can be edited.

Chassis

The Chassis area contains information that relates to the chassis, not the module. It contains the rack Revision, Serial Number, Size, and the 56AMXN module slot number.

Error Counters

These refer to communications across the backplane. They should all be 0.

The Status at the bottom of the screen indicates the status of the connection to the module.

Updating the Firmware

The card supports firmware and FPGA upgrade across the ControlLogix backplane using the Rockwell ControlFlash utility.

Install the ControlFlash software from the 56AMXN distribution CD and run it as you would to update any other ControlLogix module. Refer to the ControlFlash documentation and help for detailed information on how to use ControlFlash.

A 56AMXN/A can be upgraded to 56AMXN/B functionality by simply upgrading the firmware. No hardware changes are required.

DCS Network Update Time

From the manual for the 57C404B (publication J2-3001-3), the DCS network update time is given by:

$$\text{Update time} = (\text{DropTime} * N) + \text{NewDropTestTime} + \text{MessageTime}$$

where

DropTime = the amount of time for a master to send a message and the slave to respond = 2.99 ms

N = Number of slave drops (physical and virtual)

NewDropTestTime = amount of time for the master to poll an inactive drop and wait for its response = 2.48 ms assuming no response



MessageTime = amount of time to transfer programming terminal messages. If the master is sending a message, this is 2.09 ms. If a slave is sending a message, this is 3.395 ms.

For example, a network composed of 10 drops which is not messaging will update each drop with a period of:

$$\text{UpdateTime} = 2.99 * 10 + 2.48 = 32.38 \text{ ms}$$

Specifications

The 56AMXN/B is a standard ControlLogix module with the following specifications:

Parameter	Specification
Module Location	ControlLogix chassis
Function	ControlLogix AutoMax DCS and Remote I/O module
Description	Processor: 100MHz IDT MIPS FLASH memory: 1Mbyte (512Kx16) Local RAM: 1Mbyte (256Kx32) 50Mhz synchronous SRAM Shared RAM: 512Kbyte (128Kx32) 20ns asynchronous SRAM
Maximum Backplane Current Load	650mA @ +5.1V dc and 75mA @ 24 V dc from I/O chassis backplane
Power dissipation	5W maximum
Environmental Conditions:	
Operational Temperature	0-60°C (32-140°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Relative Humidity	5-95% without condensation
Shock Unpackaged	30g operational 50g non-operational
Vibration Unpackaged	2g from 10-150Hz
Agency Certification (when product or packaging is marked)	<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;">  </div> <div>Marked for all applicable directives</div> </div> <hr/> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;">  </div> <div>Listed Industrial Control Equipment</div> </div>
Installation Manual	Publication 56AMXN-QS001A-EN-P August 2001

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Local Drive Solutions

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Fax 508.485.5059	Fax 770.682.6491	Fax 281.233.0101
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West Coast	Eastern	Carolinas
Ph. 626.969.7647	Ph. 732.225.1360	Ph. 704.525.1455
Fax 626.334.8320	ext. 110	Fax 704.525.9025
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