



## *Installation Instructions*

# ControlLogix ControlNet Bridge

(Catalog Numbers 1756-CNB, -CNBR)  
Series C and D

Use this document as a guide to install the ControlLogix™  
ControlNet™ Bridge module.

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## Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation and Maintenance of Solid-State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

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Throughout this manual we use the following notes to make you aware of safety considerations:

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**WARNING**

Identifies information about practices or circumstances that have the potential to create an explosion hazard.

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**ATTENTION**

Identifies information about other practices or circumstances that can lead to personal injury or death, property damage or economic loss.

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Warning and Attention statements help you to:

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

We use the following note to call attention to critical information:

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**IMPORTANT**

Identifies information that is critical for successful application and understanding of the product.

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Change bars are used to indicate information that has changed or been added since the previous version of these instructions.

## **Understanding Compliance to European Union Directive**

If this product bears the CE marking, it is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

### **EMC Directive**

This product is tested to meet Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) and the following standards, in whole or in part, documented in a technical construction file:

- EN 50081-2 EMC - Generic Emission Standard, Part 2 - Industrial Environment
- EN 50082-2 EMC - Generic Immunity Standard, Part 2 - Industrial Environment

This product is intended for use in an industrial environment.

### **Low Voltage Directive**

This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61131-2 Programmable Controllers, Part 2 - Equipment Requirements and Tests.

For specific information required by EN 61131-2, see the appropriate sections in this publication, as well as the following Allen-Bradley publications:

- Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1
- Automation Systems Catalog, publication B113

Open style devices must be provided with environmental and safety protection by proper mounting in enclosures designed for specific application conditions. See NEMA Standards publication 250 and IEC publication 529, as applicable, for explanations of the degrees of protection provided by different types of enclosure.

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## Enclosure and Environmental Requirements Specific To This Product

This product must be mounted within a suitable system enclosure to prevent personal injury resulting from accessibility to live parts. The interior of this enclosure must be accessible only by the use of a tool.

This industrial control equipment is intended to operate in a Pollution Degree 2 environment, in overvoltage category II applications, (as defined in IEC publication 664A) at altitudes up to 2000 meters without derating.

## Preventing Electrostatic Discharge

The 1756-CNB and 1756-CNBR modules are sensitive to electrostatic discharge.

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### 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 bag

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For additional information refer to publication 1770-4.1, *Industrial Automation Wiring and Grounding Guidelines*.

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## Understanding Standalone and Redundant Control

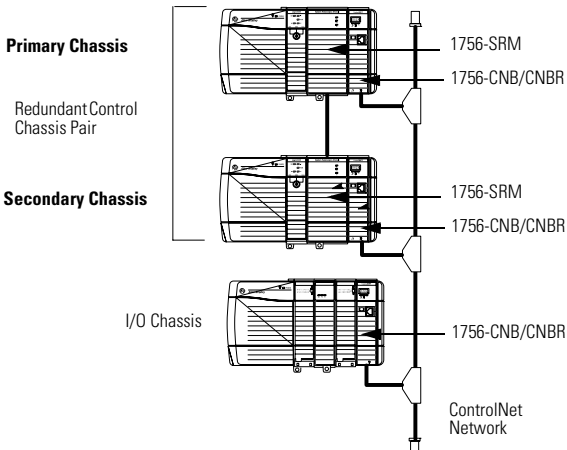
You can use both the 1756-CNB and 1756-CNBR modules either standalone or in a redundant control chassis pair. For standalone control, only one set of modules is required. For redundant control, two ControlLogix chassis are populated with identical pairs of modules called partners. The chassis that performs active control is called the primary chassis and the modules in the chassis are called primary modules. The other chassis is called the secondary chassis and the modules in the chassis are called secondary modules. These installation instructions discuss both standalone and redundant control; read them carefully to distinguish the procedures and requirements for each type of control.

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### IMPORTANT

If you use redundant control, you must select the same ControlNet Network address for each set of partner modules. You must also place the partner module(s) in the same corresponding slot(s) in their respective redundant control chassis pair.

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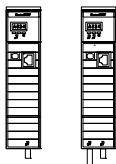


## Prepare to Install the Module

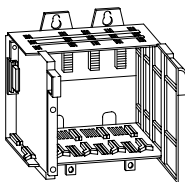
Before you install the module make sure you:

1. Know how to handle the module (see page 5)
2. Have all of the necessary components shown below:

1756-CNB or 1756-CNBR



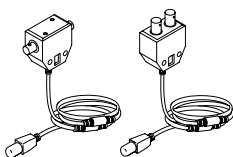
1756-A4, 1756-A7, 1756-A10,  
1756-A13, or 1756-A17



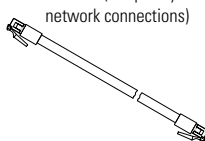
1756-PA72/75 or 1756-PB72/75  
power supply



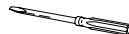
1786-TPR, -TPS  
-TPYR, or -TPYS<sup>(1)</sup>



1786-TP (temporary  
network connections)



small screwdriver (optional)



<sup>(1)</sup> 1786-TPS or 1786-TPYS taps recommended for network connections.

3. Know the type of ControlNet network:

There are two types of scheduled traffic networks for ControlNet: single-keeper networks and multi-keeper networks.

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All 1756-CNB and 1756-CNBR modules are keeper-capable, as listed in the following table.

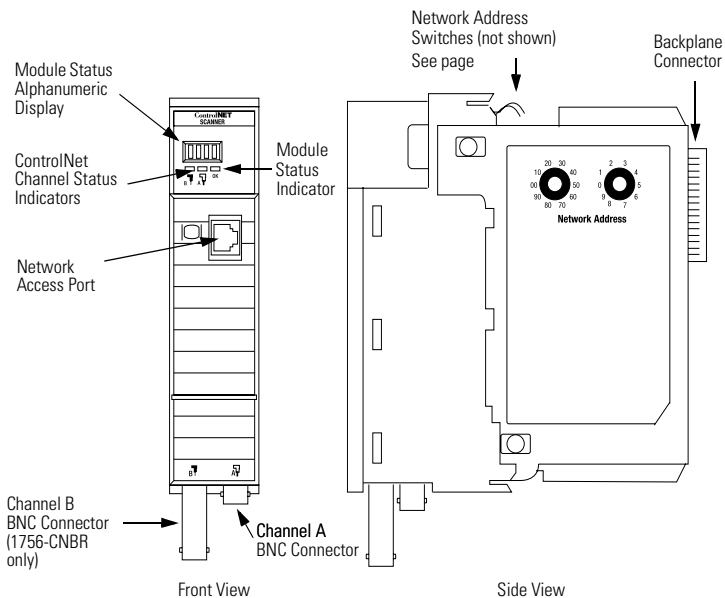
<b>CNB(R) Series</b>	<b>Major/Minor Revision</b>	<b>Keeper Type</b>
A	1.xx	Single-Keeper
B	2.xx	Multi-Keeper
C	3.xx	Single-Keeper
C	4.xx	Multi-Keeper
D	5.xx	Multi-Keeper

You must match the keeper to the type of network, or upgrade the firmware of the module at MAC ID 01 to be multi-keeper capable. Refer to the ControlLogix ControlNet Interface Module User Manual, publication 1756-6.5.3, for more information.



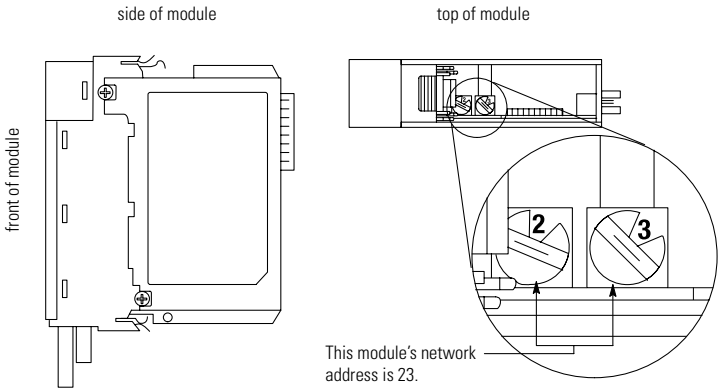
## Identify Module Features

Refer to the following figure to identify the hardware components of the 1756-CNBR and CNBR modules.



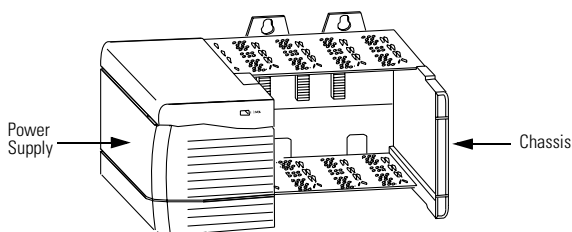
## Set the Module's Network Address Switches

Use your fingers or a small screwdriver to set the module's network address switches. For modules in a standalone chassis, you must specify a unique ControlNet network address; for modules in a redundant chassis, you must specify the same address for the secondary module that you specified for the corresponding primary module. *You can select an address of 01 to 99 for modules in a standalone chassis or 01 to 98 for modules in redundant chassis. Note that 00 is an invalid ControlNet address.*



## Prepare the Chassis for Module Installation

Before you install the CNB module, you must install and connect a ControlLogix chassis and power supply. A 4-slot chassis with a power supply is shown below.



For information on installing these products, refer to the publications listed in the following table.

Chassis Type	Chassis Installation	Power Supply	Power Supply Installation
Series B: 1756-A4, -A7, -A10, -A13	Pub. No. 1756-IN080	1756-PA72/B	Pub. No. 1756-5.67
		1756-PB72/B	
	1756-PA75/A	1756-PB75/A	Pub. No. 1756-5.78

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## Determine Module Slot Location

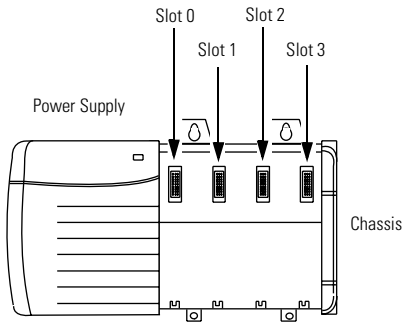
The figure below shows chassis slot numbering in a 4-slot chassis. Slot 0 is the first slot and is always the leftmost slot in the rack (the first slot to the right of the power supply). You can use any size ControlLogix chassis and install the module in any slot. You can also install multiple 1756-CNB/R modules in the same chassis. You can install as many modules as your power supply can accommodate (i.e., number for which the power supply is rated).

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**IMPORTANT**

If you plan to install a redundant system, you must place the primary and redundant module(s) in the same corresponding slot in their respective chassis. For example, if you place a 1756-CNBR module in slot 3 (from the left) in the primary chassis, you must also place a 1756-CNBR module in slot 3 in the redundant chassis.

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## Installing or Removing the Module Under Power

You can install or remove the module while chassis power is applied if you observe the following precautions.

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**WARNING**

When you insert or remove a module while backplane power is on, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:

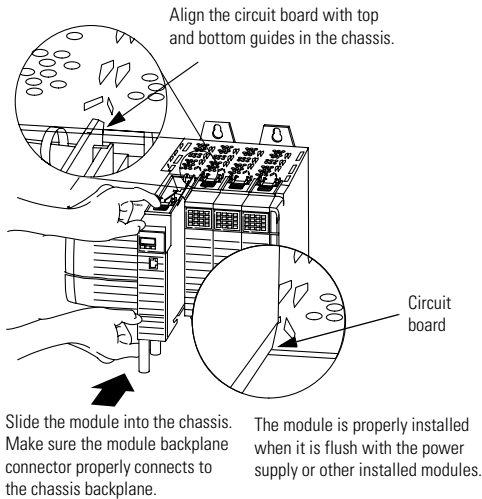
- sending an erroneous signal to your system's actuators causing unintended machine motion or loss of process control.
- causing an explosion in a hazardous environment.

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.

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## Install the Module



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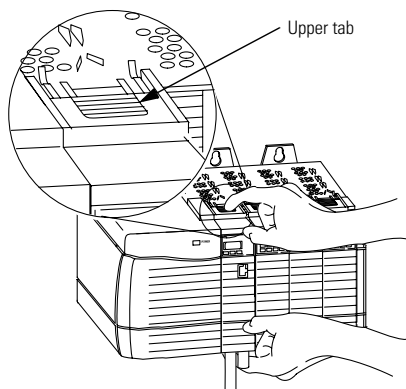
### ATTENTION



Do not force the module into the backplane connector. If you cannot seat the module with firm pressure, check the alignment. Forcing the module into the chassis can damage the backplane connector or the module.

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## Removing or Replacing the Module (if needed)



Push on the upper and lower tabs to disengage them. Then slide the module out of the chassis.

If you are replacing an existing module with an identical one, and you want to resume identical system operation, you must install the new module with the same ControlNet address in the same slot.

## Connect the Module to the Network

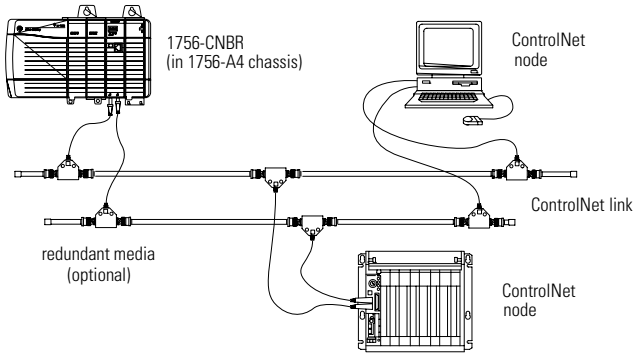
You can connect the module to the ControlNet network using a tap (1786-TPR, -TPS, -TPYR, -TPYS) or a network access cable (1786-CP).

### TIP

Use the 1786-CP cable for temporary connections (i.e., programming software). For permanent connections, use a tap.



The following figure shows an example ControlNet network using redundant media.



When connecting the 1756-CNB/R module to a ControlNet network, you should also refer to the following documentation:

- *ControlNet Coax Tap Installation Instructions*, publication 1786-5.7
- *ControlNet Cable System Planning and Installation Manual*, publication 1786-6.2.1

**TIP**

For network connections we recommend taps with a straight connector (1786-TPS or 1786-TPYS) because of the location of the BNC connectors on the bottom of the module.



## Connecting to the Network Using a Tap

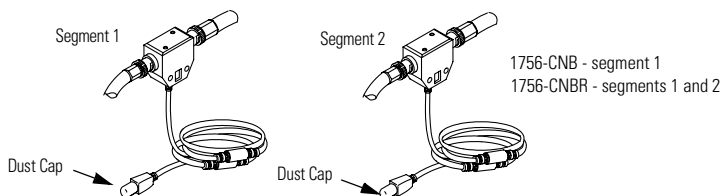
Perform the following steps to connect the module to the network using a tap.

1. Remove and save the dust cap(s) from the ControlNet tap(s).

### ATTENTION



Do not allow any metal portions of the tap to contact any conductive material. If you disconnect the tap from the module, place the dust cap back on the straight or right angle connector to prevent the connector from accidentally contacting a metallic grounded surface.



2. Connect the tap's straight or right-angle connector to the module's BNC connector.

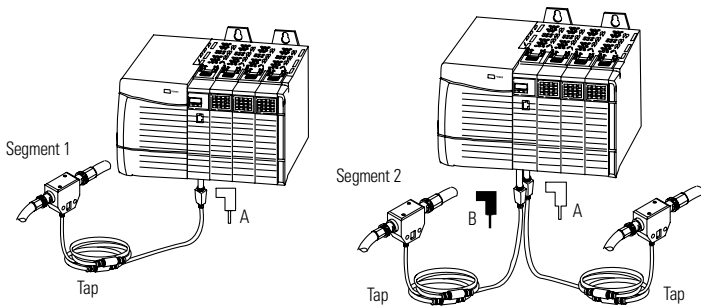
If your node supports	Connect the tap's connector
non-redundant media (1756-CNB)	to the channel A connector on the module (channel B on the 1756-CNBR is not used) <sup>(1)</sup>
redundant media	<ul style="list-style-type: none"> <li>•from trunkline A to channel A on the 1756-CNB</li> <li>•from trunkline B to channel B on the 1756-CNBR</li> </ul>

<sup>(1)</sup> While both channels are active, Rockwell recommends using channel A for non-redundant media.

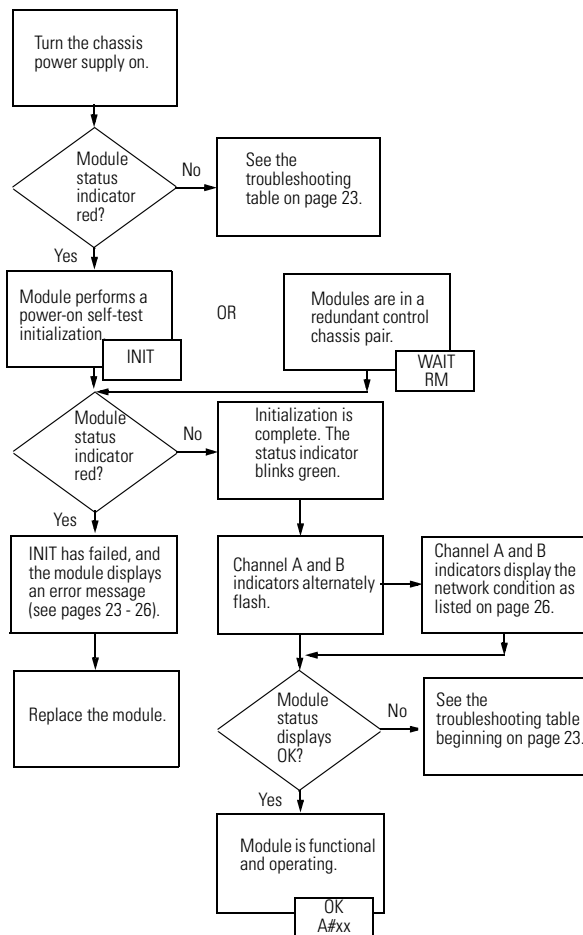
**IMPORTANT**

To prevent inadvertent reversal of the tap connections (resulting in incorrect status displays requiring troubleshooting), check the tap drop cable for the label indicating the attached segment before making your connection.

To work properly, when you use modules in a redundant control chassis pair, the primary and redundant partner modules must be connected to the same network segment. If you are using redundant media, connect the channel of each partner to the same network segment.



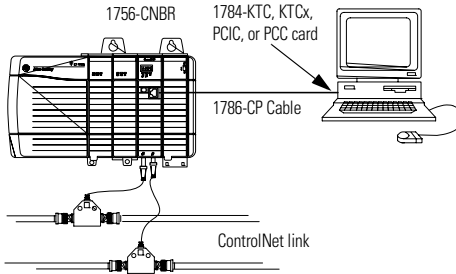
3. Apply power to the module and check module status. Use the following flowchart as a guide.



## Connecting a Programming Terminal to the Network Using 1786-CP Cable

To connect a programming terminal to the network using a 1786-CP cable, you have the following options:

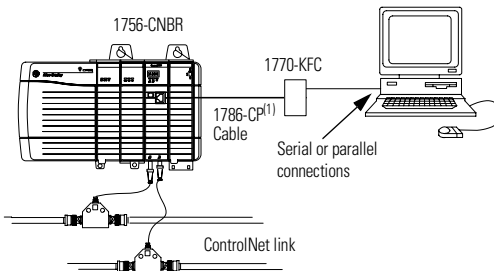
1. using a 1784-KTC, -KTCx, or -PCC communication card and a 1786-CP cable:



### IMPORTANT

To work properly, the primary and redundant partner module must be connected to the same network segment. If you are using redundant media, connect the channel of each partner to the same network segment.

2. using a 1770-KFC communication interface, a serial or parallel connection, and a 1786-CP cable:



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The 1786-CP cable can be plugged into any ControlNet product's NAP to provide programming capability on the ControlNet network. A programming terminal connected through this cable is counted as a node and must have a unique network address.

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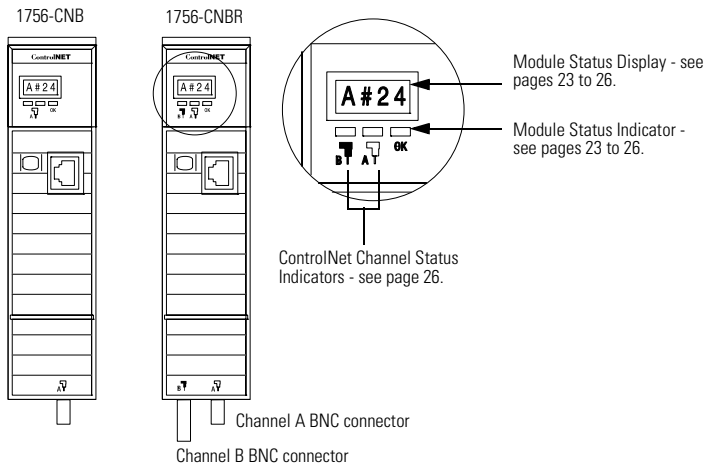
**ATTENTION**

Use a 1786-CP cable when connecting a programming terminal to the network through NAPs. Using a commercially available RJ-style cable could result in network failure.

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## Troubleshooting



The 1756-CNB and 1756-CNBR modules have the diagnostic indicators shown below:





## Module Status Indicator and Display

The Module Status Indicator LED and Module Status Display provide diagnostic information as summarized in the following table.

### Diagnosics



LED	Display	Cause	Action
 OK			
Off	None	Module not communicating due to a power supply fault or internal fault.	<ol style="list-style-type: none"> <li>1. Check the power supply.</li> <li>2. Check the cable connectors.</li> <li>3. Make sure the module is firmly seated in the chassis.</li> <li>4. If the indicator remains off, replace the module.</li> </ol>
Red	Msg scrolls <sup>(1)</sup>	Module's network address is set to 00, an invalid ControlNet address, or 99, an invalid ControlNet address if you are using redundant control. See footnote at end of table.	<ol style="list-style-type: none"> <li>1. (Optional, see page 11.) Turn chassis power supply off.</li> <li>2. Remove the module from the chassis.</li> <li>3. Set the network address switches to a unique address (01-99, or 01-98 if redundant control)</li> <li>4. Install the module in the chassis.</li> <li>5. If off, turn chassis power supply on.</li> </ol>
BPA# ERR		Module detected a different slot address from that latched in at power-up. Excessive noise on the backplane causes this error.	Replace the chassis or module.
BPRX ERR		Too many CRC errors being generated by the multicast backplane receiver, so the backplane multicast receivers have been shut off.	Replace the module.
BPIC ERR		Hardware fault within the module.	Replace the module.
CNIC ERR			

## Diagnostics



LED	Display	Cause	Action
 OK			
Red	DUPL NODE	For a redundant system this may be a temporary condition during chassis switchover. Otherwise, the module's network address is the same as another module's on the link.	<ol style="list-style-type: none"> <li>1. (For redundant systems only.) Wait 10 seconds; if the condition persists, perform the following steps:</li> <li>2. (Optional, see page 11.) Turn chassis power supply off.</li> <li>3. Remove the module from the chassis.</li> <li>4. Set the network address switches to a unique address (01-99).</li> <li>5. Install the module in the chassis.</li> <li>6. If off, turn chassis power supply on.</li> </ol>
	RACK ERR	Cannot read backplane EEPROM, or rack/slot address incorrect	Replace the chassis.
	STOP	CNB commanded to stop functioning by the redundancy module. This occurs when a non-redundancy compliant CNB is placed into a redundant secondary chassis.	Remove non-redundancy compliant CNB from redundant secondary chassis and replace with redundancy compliant CNB.
	WAIT RM	CNB waiting for the redundancy module to complete power-up.	None required.
Flashing Red	BOOT	Module has invalid firmware.	Update module firmware with ControlFlash Update Utility.
	ROM UPDT	Flash update is in progress.	None required.
	SNGL KPR!	Module detected that it has been connected to a Cnet 1.5 (single-keeper) network.	Update the CNB module's firmware at MAC ID 01 and reschedule the network.



## Diagnostics

LED	Display	Cause	Action
 OK			
Green	OK	Normal operation	None required
	INIT	Module is initializing.	
	BW >MAX	Module is receiving too much network traffic and connections are timing out. The network bandwidth has been exceeded.	None require (temporary condition). If this happens frequently, add another 1756-CNB or -CNBR and split the traffic between them.
	CMPT	Secondary CNB is compatible with its partner.	None required.
	DSNP	Secondary CNB is disqualified with no partner.	Check corresponding slot of primary chassis for type and revision of module.
	PwDS	CNB is primary with a disqualified secondary partner.	Check the type and revision of the 1756-CNB module.
	PwQg	CNB is primary with a qualifying secondary partner.	Redundant system status. No action required.
	PwQS	CNB is primary with a qualified secondary partner.	
	PwNS	CNB is primary with no secondary partner.	Check corresponding slot of secondary chassis for correct module.
	Qfng	Secondary CNB is qualifying.	Redundant system status. No action required.
QS	Secondary CNB is qualified.		
SW ERR	Node address switch changed after power-up.	None required, but we recommend that you either return switches to their original settings or replace the module, since this could indicate a latent hardware problem.	
Flashing Green	CNFG ERR	ControlNet configuration error.	Recheck configuration.
	NET ERR	Network cabling error or no other active nodes on network.	Re-check your network cabling and make sure another node on the network is active (on line).

## Diagnostics

LED	Display	Cause	Action
 OK			
Green or Off	SO_1	Old primary switchover phase 1 in progress.	If the display shows any message for more than three seconds, then the CNB module failed during transition from one redundancy phase to another. Replace one or both redundancy modules.
	SO_2	Old primary switchover phase 2 in progress.	
	SO_3	Old primary switchover phase 3 in progress.	
	SN_1	New primary switchover phase 1 in progress.	
	SN_2	New primary switchover phase 2 in progress.	
	SN_3	New primary switchover phase 3 in progress.	
	?Cpt	CNB has not determined if it is compatible.	
!Cpt	CNB has determined that it is not compatible.	Replace the CNB module with correct type and revision.	



<sup>(1)</sup> If switches are set to 00 the display scrolls "FAULT: ADDRESS SWITCHES = 00, ILLEGAL"  
If switches are set to 99 in a redundant chassis, the display scrolls: "FAULT: ADDRESS SWITCHES = 99, ILLEGAL IN REDUNDANT SYSTEM"

### ControlNet Channel Status Indicators



The ControlNet channel status indicators appear in one of the following states:

- steady - indicator is on continuously in the defined state.
- alternating - the two indicators alternate between the two defined states at the same time (applies to both indicators viewed together). The two indicators are always in opposite states, out of phase.
- flashing - the indicator alternates between the two defined states (applies to each indicator viewed independent of the other). If both indicators are flashing, they must flash together, in phase.

The following table summarizes the meanings of these states:

 and 	<b>Cause</b>	<b>Action</b>
Off	No power	None or power up.
Steady red	Faulted unit	Cycle power or reset unit If fault persists, contact A-B representative or distributor.
Alternating red/green	Self-test	None
Alternating red/off	Incorrect node configuration	Check network address and other ControlNet configuration parameters.

 or 	<b>Cause</b>	<b>Action</b>
Off	Channel disabled	Program network for redundant media, if required.
Steady green	Normal operation	None.
Flashing green/off	Temporary errors	None; unit will self-correct.
	Node is not configured to go on line	Make sure the configuration manager node is present and working and selected address is not greater than selected UMAX. <sup>(1)</sup>
Flashing red/off	Media fault	Check media for broken cables, loose connectors, missing terminators, etc.
	No other nodes present on network	Add other nodes to the network.
Flashing red/green	Incorrect network configuration	Cycle power or reset unit. If fault persists, contact A-B representative or distributor.

<sup>(1)</sup> The configuration manager node is the node responsible for distributing ControlNet configuration data to all nodes on the network.

## Hazardous Location information

**The following information applies when operating this equipment in hazardous locations:**

Products marked “CL I, DIV 2, GP A, B, C, D” are suitable for use in Class I Division 2 Groups A, B, C, D, Hazardous Locations and nonhazardous locations only. Each product is supplied with markings on the rating nameplate indicating the hazardous location temperature code. When combining products within a system, the most adverse temperature code (lowest “T” number) may be used to help determine the overall temperature code of the system. Combinations of equipment in your system are subject to investigation by the local Authority Having Jurisdiction at the time of installation.

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### WARNING



### EXPLOSION HAZARD

- Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous.
  - Do not disconnect connections to this equipment unless power has been removed or the area is known to be nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product.
  - Substitution of components may impair suitability for Class I, Division 2.
  - If this product contains batteries, they must only be changed in an area known to be nonhazardous.
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## Informations sur l'utilisation de cet équipement en environnements dangereux :

Les produits marqués « CL I, DIV 2, GP A, B, C, D » ne conviennent qu'à une utilisation en environnements de Classe I Division 2 Groupes A, B, C, D dangereux et non dangereux. Chaque produit est livré avec des marquages sur sa plaque d'identification qui indiquent le code de température pour les environnements dangereux. Lorsque plusieurs produits sont combinés dans un système, le code de température le plus défavorable (code de température le plus faible) peut être utilisé pour déterminer le code de température global du système. Les combinaisons d'équipements dans le système sont sujettes à inspection par les autorités locales qualifiées au moment de l'installation.

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### AVERTISSEMENT



### RISQUE D'EXPLOSION

- Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement.
  - Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. Fixer tous les connecteurs externes reliés à cet équipement à l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens fournis avec ce produit.
  - La substitution de composants peut rendre cet équipement inadapté à une utilisation en environnement de Classe 1, Division 2.
  - S'assurer que l'environnement est classé non dangereux avant de changer les piles.
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## Module Specifications

		1756-CNB	1756-CNBR
<b>ControlNet Interface</b>	connectors	<ul style="list-style-type: none"> <li>1 BNC connector for non-redundant media operation</li> <li>1 NAP (RJ-45 8-pin with shield)</li> </ul>	<ul style="list-style-type: none"> <li>2 BNC connectors for redundant media operation</li> <li>1 NAP (RJ-45 8-pin with shield)</li> </ul>
	cable	quad shield RG-6 coaxial cable	
	ground isolation	transformer	
<b>Electrical</b>	power dissipation	5.14 W	
	thermal dissipation	17.5 BTU/hr	
	backplane current	970 mA @ 5.1 V 1.7 mA @ 24 V	1.0 A @ 5.1 V 1.7 mA @ 24 V
<b>Environmental</b>	operational temperature	0 to 60°C (32 to 140°F)	
	storage temperature	-40 to 85°C (-40 to 185°F)	
	relative humidity	5 to 95% (without condensation)	
<b>Physical</b>	location	any slot in a 1756 chassis	
	weight	0.260 kg (0.57 lb.)	0.293 kg (0.64 lb.)
<b>Agency Certification</b> (when product or packaging is marked)		 Listed Industrial Control Equipment  Certified Process Control Equipment Certified Class I, Division 2, Group A, B, C, D  Approved class I, Division 2, Group A,B,C,D  Marked for all applicable directives  Marked for all applicable acts N23	

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