



# ControlNet Daughtercard

Catalog Number 1788-CNF, -CNFR

This document describes how to configure the ControlNet™ 1788-CNF and -CNFR daughtercards. In this document, we use the term 'the card' to refer to both daughtercards collectively. When one card is different from the other, we refer to the daughtercard by name.

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## Related Publications

If you are connecting the card directly to a ControlNet network, you should also refer to the following publications:

Catalog Number:	Publication Name:	Publication Number:
N/A	ControlNet Fiber Media Planning and Installation Guide	CNET-IN001A-EN-P
N/A	ControlNet Cable Planning and Installation Guide	1786-6.2.1
N/A	ControlNet Cable System Planning and Installation Guide Release Note	1786-6.2.1-RN1
1786-RPA	ControlNet Modular Repeater Adapter Installation Instructions	1786-5.13
1786-RPFS	ControlNet Modular Repeater Short-distance Fiber Module Installation Instructions	1786-5.12
1786-TPR, -TPS, -TPYR, -TPYS	ControlNet Coax Tap Installation Instructions	1786-5.7

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**IMPORTANT**

**Before** you install your fiber-based network, refer to the ControlNet Fiber Media Planning and Installation Guide, publication CNET-IN001A-EN-P.

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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, sample programs 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 notes to make you aware of safety considerations:

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### ATTENTION



Identifies information about practices or circumstances that can lead to property damage or economic loss if procedures are not followed properly.

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### WARNING



Identifies information about practices or circumstances that can lead to personal injury or death if procedures are not followed properly.

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Attention statements help you to:

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

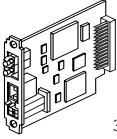
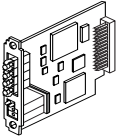
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### IMPORTANT

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

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## About the Daughtercards



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The network daughtercard architecture defines a common hardware and software interface that several different network interface cards will support. This lets products that have been designed to support the network daughtercard option to support several different Rockwell Automation networks.

## About the ControlNet Daughtercard

You can install the 1788-CNF or -CNFR ControlNet daughtercard in any host device that supports the ControlNet daughtercard<sup>1</sup>.

Every ControlNet network requires at least one module that is able to store parameters and configure the network with those parameters upon start-up. This module is called a 'keeper' since it keeps the network configuration.

Any 1788-CNF or -CNFR card can keep the network parameters at any legal node address (01 to 99). Multiple devices on any one network can act as the network keeper. Each device capable of being the network keeper acts to back up the current keeper. This backup function is automatic and requires no action on your part.

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**IMPORTANT**

On the 1788-CNF or -CNFR card, the non-volatile keeper data is **erased** when a firmware update is performed.

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1. The host device must provide a suitable power source per the restrictions in the specifications table.

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## European Communities (EC) Directive Compliance

If this product has the CE mark 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 the Council Directive 89/336/EC Electromagnetic Compatibility (EMC) by applying 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 Allen-Bradley publication Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

This equipment is classified as open equipment and must be mounted in an enclosure during operation to provide safety protection.

## How to Handle the Card

**ATTENTION**



The card uses CMOS technology, which is highly sensitive to electrostatic discharge (ESD). ESD may be present whenever you are handling the card. Handling the card without any ESD protection can cause internal circuit damage that may not be apparent during installation or initial use.

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Take these precautions to guard against ESD damage:

- Touch a grounded object to discharge any built-up static.
- Do not touch the connector or connector pins on the card.
- When not in use, store the card in the anti-static packaging in which it was shipped.

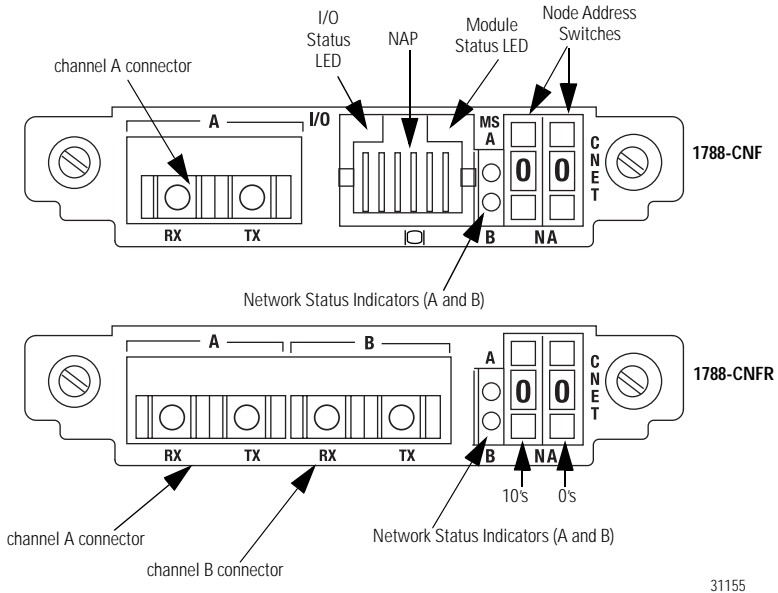
## Set the Node Address

You must set two switch assemblies to configure the daughtercard with its unique network address. Figure 1 (next page) shows the location of the switches. These switches are read on powerup to establish the network address of the card.

Set the node address to a value between 1 and 99. For optimum throughput, assign addresses to your ControlNet nodes in a sequential order starting with 01.

Node address 00 is not a valid ControlNet address. You should only use node address 00 if the product that uses the ControlNet daughtercard has the ability to set the node address using the host device interface.

This feature is typically used on products that do not provide easy customer access to the node address switches. If you set the node address switch to 00, it lets the host in which the daughtercard resides set the node address, rather than letting the daughtercard read the node address from the switch settings.

**Figure 1 -- Set the Node Address**

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## Install the Card

Due to wide variation in available host devices, we cannot provide specific installation instructions in this document. For instructions on how to install the daughtercard in a host device, refer to the user manual for the particular host device.

### IMPORTANT

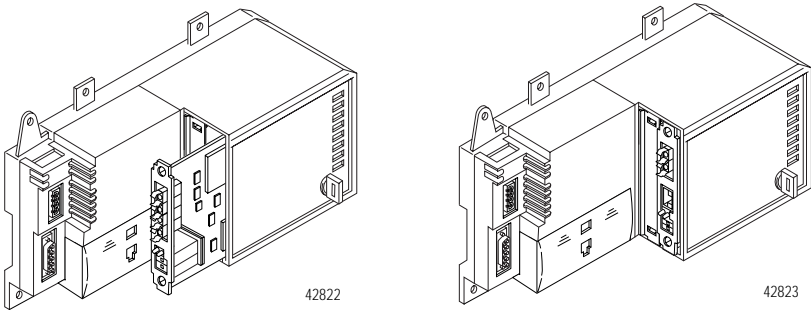
Do not install or remove the daughtercard while the host is under power.

### WARNING



Inserting or removing the module while host power is on may cause an electrical arc. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

**Figure 2 -- Install the Card**



## Connect the Card to the Network

After you have installed the card, you can connect it to the network. You must connect the card to the network using an approved ControlNet fiber cable such as one listed below:

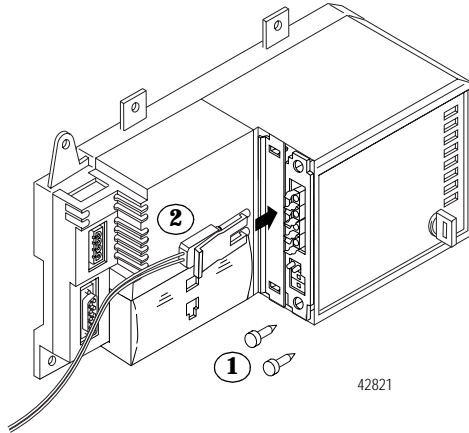
- 1786-FS10 (10m cable assembly)
- 1786-FS20 (20m cable assembly)
- 1786-FS60 (60m cable assembly)
- 1786-FS100 (100m cable assembly)
- 1786-FS200 (200m cable assembly)
- 1786-FS300 (300m cable assembly)

For more fiber cable options, refer to the ControlNet Fiber Media Planning and Installation Guide, publication CNET-IN001A-EN-P.



## Connect to the Network Using a Fiber Cable

1. Remove and save the protective caps from the ControlNet daughtercards.
2. Connect the fiber cable connector to the module's connector.



## Wiring the Fiber Module for Zipcord Operation

### IMPORTANT

To prevent inadvertent reversal of the trunk cable connections (resulting in incorrect status displays), check the drop cable for a label indicating the attached cable before you make your connection.

The zipcord uses a duplex cable. Duplex cables use a single cable that contains two separate fibers, one for transmit and one for receive.

To wire the module:

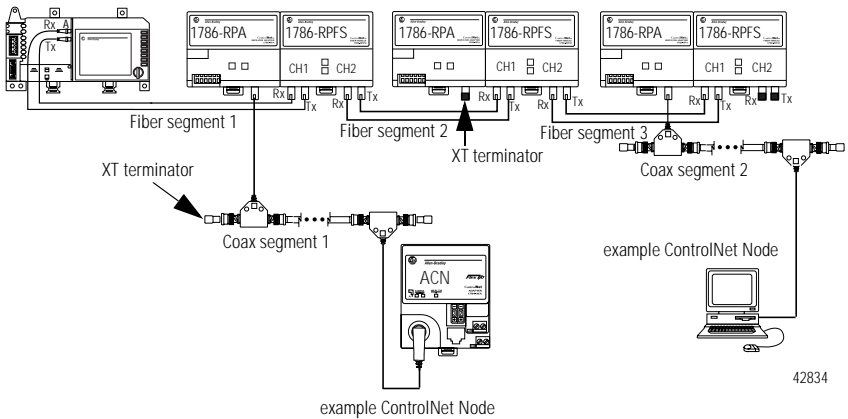
- Hold down the latch and insert the Channel A zipcord connector into the duplex socket until the pins and latch lock into place (see the illustration below).

Make sure you insert the blue pin (receive) of the zipcord connector into the left Rx and the black pin (transmit) into the right Tx socket.

If your network supports	Connect the fiber cable
nonredundant media (1788-CNF or -CNFR)	to the <b>channel A</b> connector on the module <b>(channel B on the 1788-CNFR is not used.)</b> <sup>1</sup>
redundant media (1788-CNFR)	from <b>trunk-cable A</b> to <b>channel A</b> on the 1788-CNFR and from <b>trunk-cable B</b> to <b>channel B</b> on the 1788-CNFR.

1. Rockwell Automation recommends using channel A for non-redundant media.

**Figure 3 -- Example of ControlNet Network Topology**



**IMPORTANT**

It is not necessary to install nodes on coax segments. If you are only using the repeaters to extend, then install a 75-Ω terminator (1786-XT) on the BNC coax connector on the fiber repeater adapter (1786-RPA). This should be done to all repeaters that are not connected to coax segments.

When you connect the daughtercard to a ControlNet network, you should also refer to the ControlNet Fiber Media Planning and Installation Guide, publication CNET-IN001A-EN-P.

See page 13 for information about status indicators.

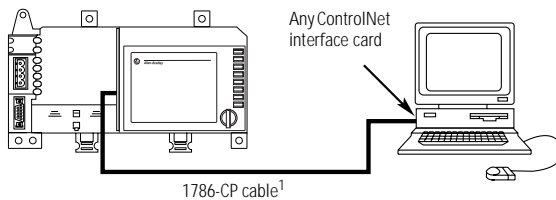
**IMPORTANT**

If you use a non-redundant cable system, all ControlNet devices must be on the same channel, we recommend channel A.

## Connect to the Network Using a 1786-CP Cable

Use the following wiring diagram to connect the programming terminal to the network using a 1786-CP cable.

**Figure 6 -- Connect to the Network via the 1788-CNF NAP**



<sup>1</sup> The 1786-CP cable can be plugged into any ControlNet product's NAP (Network Access Port) 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 address.

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**ATTENTION**

Use the 1786-CP cable when you connect a programming terminal to the network through the NAP port; using another cable could result in possible network failures or product damage.

**WARNING**

If you connect or disconnect the ControlNet NAP cable with power applied to this module or any device on the network, 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.

**IMPORTANT**

The NAP is only available on the 1788-CNF. It is not available on the 1788-CNFR.

*Wiring for the 1786-CP Connector Cable*

Connector 1			Connector 2		
Wire Number	Signal Mnemonic	Signal Name	Wire Number	Signal Mnemonic	Signal Name
1	ISO-GND	Isolated Ground	1	ISO-GND	Isolated Ground
2	N.C.	No Connection	2	N.C.	No Connection
3	PTTX-H	Transmit Data High	3	PTRX-H	Receive Data High
4	PTTX-L	Transmit Data Low	4	PTRX-L	Receive Data Low
5	PTRX-L	Receive Data Low	5	PTTX-L	Transmit Data Low
6	PTRX-H	Receive Data High	6	PTTX-H	Transmit Data High
7	N.C.	No Connection	7	N.C.	No Connection
8	ISO-GND	Isolated Ground	8	ISO-GND	Isolated Ground

**Daughtercard Performance**

Due to wide variation in available host devices, we cannot provide specific performance capabilities in this document. For information concerning host/daughtercard performance characteristics, refer to the user manual for the particular host device.

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## Troubleshoot with the Status Indicators

Status indicators provide information about the card and the network when you are connected via the fiber connectors. The following definitions and tables outline the possible states, explains what each state means to you, and indicates what action you should take, if any, to correct that state.

Definition of terms:

- **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 when *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 flash together, in phase.

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### IMPORTANT

Keep in mind that the Module Status indicator reflects the module state, e.g., self-test, firmware update, normal operation but no connection established, etc. The network status LEDs, A and B, reflect network status. Remember that the host is able to engage in local messaging with the card although it is detached from the network. Therefore, the Module Status LED is flashing green if the host has successfully started the card. Note, however, that until the host removes reset, all LEDs on the daughtercard will remain off.

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Table 1: Module and I/O Status Indicators for 1788-CNF

Indicator	Color	Probable Cause(s)	Recommended Action
Module Status (MS)	Off	<ul style="list-style-type: none"> <li>•No power</li> <li>•Host is faulted</li> <li>•Host is holding daughtercard in reset</li> </ul>	<ul style="list-style-type: none"> <li>•Check the power supply.</li> <li>•Ensure that the daughtercard is firmly seated in the slot.</li> <li>•Cycle power. If the indicator remains off, replace the daughtercard or the host.</li> </ul>
	Steady Red	Major fault	There is a hardware fault with the module. Cycle power. If the problem persists, replace the daughtercard.
	Flashing Red (Minor fault)	Firmware update in progress	No action required (firmware update in progress).
		Node address switch change	The daughtercard's node address switches may have been changed since power-up. Change the node address switches back to the original setting. The module will continue to operate properly.
		Invalid module firmware	Update module firmware with ControlFlash Update utility.
		Duplicate node address	The daughtercard's node address duplicates that of another device. Remove power, change the node address to a unique setting, then apply power.
		Node address switch set to 00	Host must set valid node address.
	Flashing Green	No connections established	No action is required.
	Steady Green	Connections established	No action is required.
Flashing Red/ Green	Self-test	The module is performing self-diagnostics. Wait briefly to see if problem corrects itself. If problem persists, check the host. If the daughtercard cannot communicate with the host, it may remain in self-test mode.	
I/O Status (I/O)	Always Off		No action is required. This LED is on during the LED portion of the self-tests.

**IMPORTANT**

The Module Status and I/O Status indicators are only available on the 1788-CNF.

Table 2: Network Status Indicators

Indicator	Color	Probable Cause	Recommended Action
<b>A or B (viewed separately)</b>	Off	Channel disabled	Program network for redundant media, if required.
	Steady Green	Normal operation	No action is required.
	Flashing Green/Off	Temporary network errors	None, unit will self-correct.
		Node is not configured to go on line	Make sure the configuration keeper node is present and working.
	Flashing Red/Off	Media fault	Check media for broken cables, loose connectors, missing terminators, etc. If condition persists, refer to ControlNet Cable Planning and Installation Manual, publication 1786-6.2.1.
		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 your Rockwell Automation representative or distributor.	
<b>A and B (viewed together)</b>	Off	See the MS indicator for additional information	No action is required or apply power.
	Steady Red	Faulted unit	Cycle power or reset unit. If fault persists, contact your Rockwell Automation representative or distributor.
	Alternating Red/Green	Self-test	No action is required.
	Alternating Red/Off	Incorrect node configuration	Check network address and other ControlNet configuration parameters.

## 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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## Specifications

Characteristic	Value
Power Requirements <sup>1</sup>	1788-CNF: 5V dc @ 440 mA (maximum) 1788-CNFR: 5V dc @ 450 mA (maximum)
Conductor	Category 2 <sup>2</sup>
Environmental Specifications	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. Also refer to the user manual for your host device.
Temperature	This product is suitable for application in equipment that is rated 0 to 60°C (32 to 140°F) maximum. It is acceptable for the ambient slot temperature immediately surrounding this product to reach 85°C (185°F) maximum.
Weight	0.1 kg (0.2 lb.)
Agency Certifications When product it marked:	 UL Recognized Component Industrial Control Equipment  Certified component Process Control Equipment Certified component Class I, Division 2, Group A, B, C, D  Marked for all applicable directives  Marked for all applicable acts N223  <b>ControlNet</b> <sup>™</sup> <small>CONFORMANCE TESTED</small> ControlNet International Conformance Tested

<sup>1</sup> To comply with UL and CSA restrictions, this equipment must be powered from a source compliant with the following: Class 2 or Limited Voltage/Current, as defined in UL 508 Seventeenth Edition Section 32; and Separated Extra-Low Voltage (SELV), as defined in CSA C22.2 no. 1010, Annex H.

<sup>2</sup> Refer to publication 1770-4.1, Industrial Automation Wiring and Grounding Guidelines.

**Notes:**

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