ControlNet Modular Repeater Dual Copper Module

Catalog Number 1786-RPCD

This document describes how to install and apply the 1786-RPCD dual copper repeater module.

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 and 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, Rockwell Automation 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.

Throughout this document we use notes to make you aware of safety considerations:

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

Attention statements help you to:

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

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

Rockwell Automation Support

Rockwell Automation offers support services worldwide, with over 75 sales/support offices, over 500 authorized distributors, and 260 authorized systems integrators located throughout the United States alone, plus Rockwell Automation representatives in every major country around the world. Contact your local Rockwell Automation representative for:

- sales and order support
- product technical training
- warranty support
- support service agreements

Obtain Pre-Sales Product Support

If you need to contact Rockwell Automation for pre-sales product support, try one of the following methods:

- Call your local Rockwell Automation representative
- Network Pre-sales support line, 1.440.646.3638 (3NET)
- Pre-Sales e-mail, RACle3net@ra.rockwell.com

Obtain Technical Product Support

If you need to contact Rockwell Automation for technical assistance, try one of the following methods:

- Call your local Rockwell Automation representative
- Post-Sales Technical Support, 1.440.646.5800
- Fax Back system, 1.440.646.5436 (requires a touch-tone telephone)
- Web Links http://www.ab.com — as a registered member, open to http://www.ab.com/mem/technotes/techmain.html

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 5001082-2 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 section in the following Allen-Bradley publications:

- Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1
- Automation Systems Catalog, publication B111
- ControlNet Coax Planning and Installation Guide, publication 1786-6.2.1

About the Dual Copper Repeater Module

Use this copper repeater module when the:

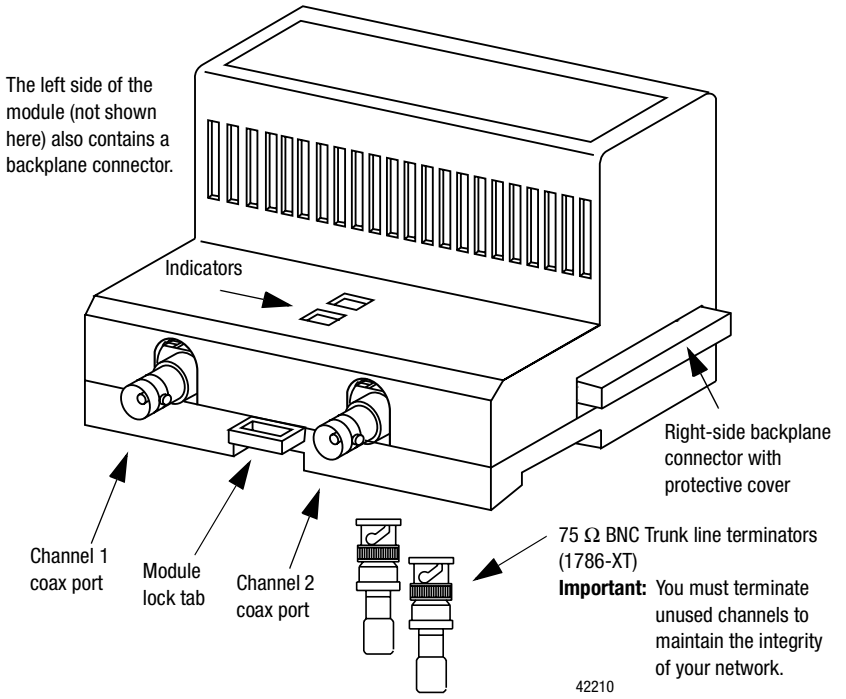
- design of the network requires a hub based topology
- segment requires a greater copper distance
- design requires a isolated segment

The copper repeater module allows multiple 1000m copper segments with up to five repeaters in a series. You can communicate to any two nodes through a maximum of 5 repeaters. See pages 16-19 for topology examples and segment length constraints.

The module provides two copper channels and activity LED indicators for each channel.

The figure below identifies the components of the module:

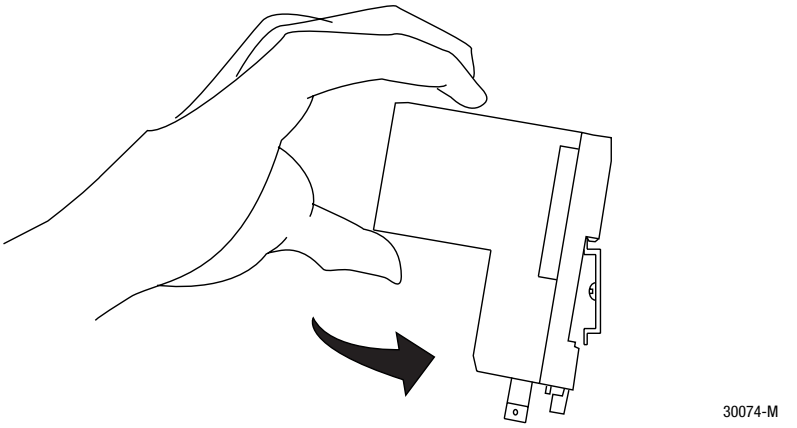
Figure 1 The 1786-RPCD Dual Copper Module



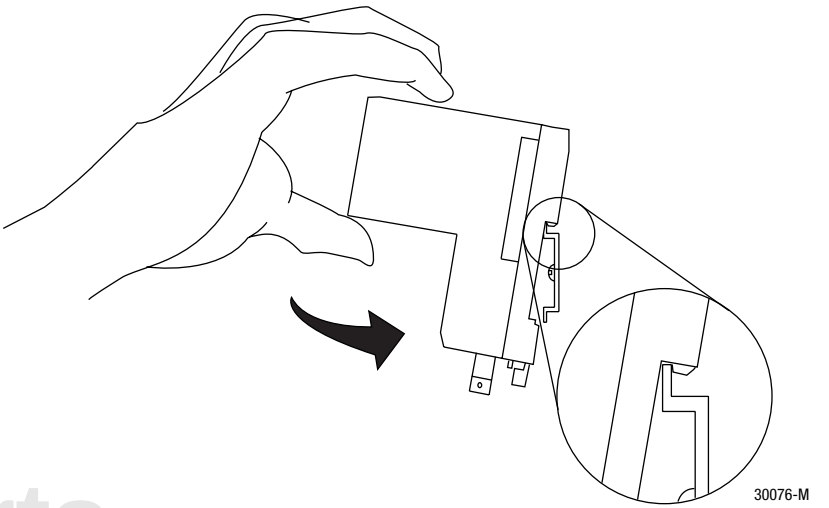
Mount the Dual Copper Repeater Module

To mount the module on the DIN rail:

1. Position the module on the 35×7.5mm DIN rail (Allen-Bradley part number 199-DRI; 46277-3; EN 50022) at a 30° angle.



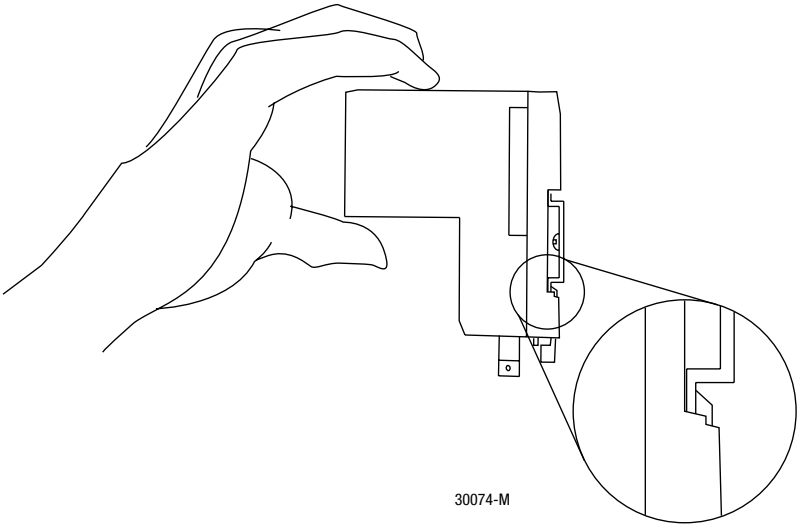
2. Hook the lip of on the rear of the module onto the top of the DIN rail and rotate the module onto the rail.



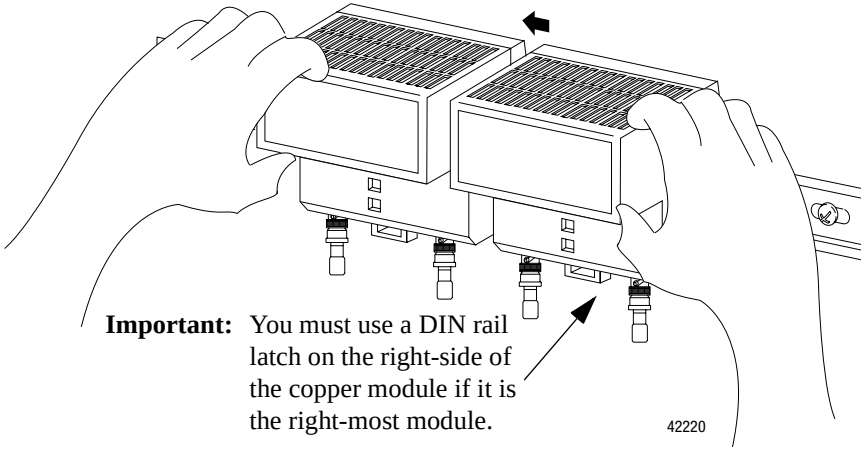
3. Press the module down to the DIN rail until flush.

The locking tab should snap into position and lock the module onto the DIN rail. If the tab does not snap into position, follow step 4. If the tab does snap into position, proceed to step 5.

4. Use a screwdriver to move the lock tab down while you press the module flush onto the DIN rail. Release the lock tab to secure the module into place. If necessary, push up on the lock tab to secure the module into place.



5. Once you attach the modules to the DIN rail, slide the modules to the left to attach to the repeater adapter or another copper repeater module.



6. Use DIN rail end anchors to secure the units together.

ATTENTION: Be certain that you secure the adapter and repeater modules together with DIN rail anchors. Failure to do so may result in loss of communication and/or damage to modules.

Important: You can attach a maximum of four repeater modules (1786-RPCD) to a repeater adapter (1786-RPA). If you exceed the repeater limit, you may cause damage to the repeater adapter and repeaters. Four repeaters can draw up to 1.6A @ 5V dc in power consumption. If you exceed this power limit, you may cause damage to the repeater adapter and repeaters.

7. Connect terminators to unused channels as shown in “Utilize Trunk Line Terminators” on page 10.

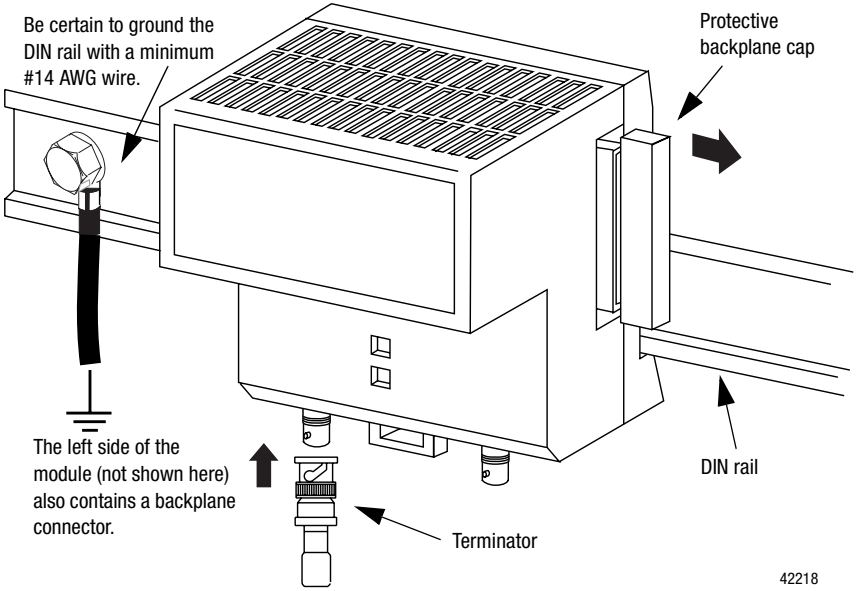
8. Connect the module wiring as shown in “Wire the Dual Copper Repeater Module” on page 12.

9. Ground your DIN rail in accordance with local codes using a minimum #14 AWG wire. See page 10 for DIN rail ground wire example.

Utilize Trunk Line Terminators

When you are not going to connect a trunk line to a channel on the 1786-RPCD repeater module, connect a 75 Ω trunk line terminator (1786-XT) to maintain the integrity of your network.

Figure 2 Trunk Line Terminators

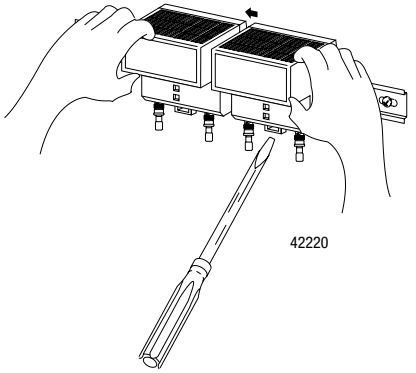


If:	Then:
you are not going to use a channel	keep the terminator on an unused channel for optimal network performance
you connect another repeater module or repeater adapter to the right backplane connector	remove the protective backplane cap and save the cap for future use
you are not going to connect a module to the right backplane connector	leave the backplane cap attached
the module is in the right-most position	attach a DIN rail latch

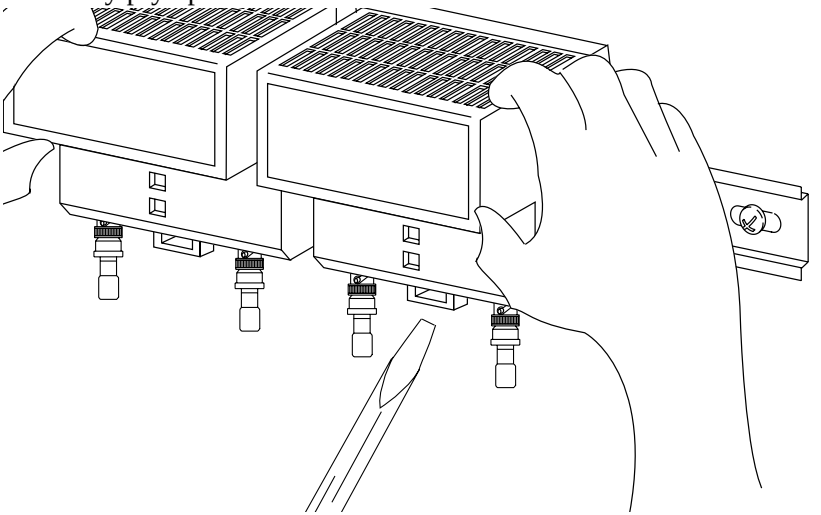
Remove the Module from the DIN Rail

To remove the module from the DIN rail, do the following:

1. Insert a screw driver into the module lock tab.



2. Gently pry up on the lock tab.



The module should detach from the DIN rail. If the module does not unlock, try more pressure while you pry up on the lock tab with the screw driver.

Wire the Dual Copper Repeater Module

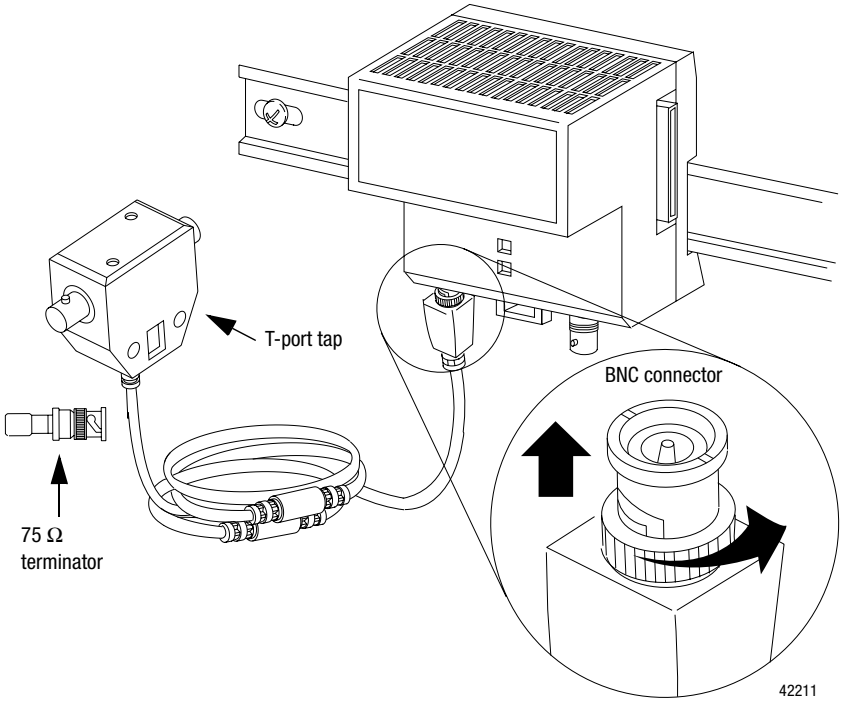
If you only need to wire one channel, you can use either channel 1 or channel 2.

To wire the module for channel 1:

1. Connect the copper to port #1.

a. Align the knob of the BNC cable connector with the locks of the BNC module connector, and insert the connector into channel 1.

Figure 3 Wire the copper repeater module



b. Twist the BNC connector until the bayonet lug is locked into place.

2. To connect channel 2, repeat Step 1.

To wire the module for channel 2:

1. Repeat the steps for channel 1 on page 12.

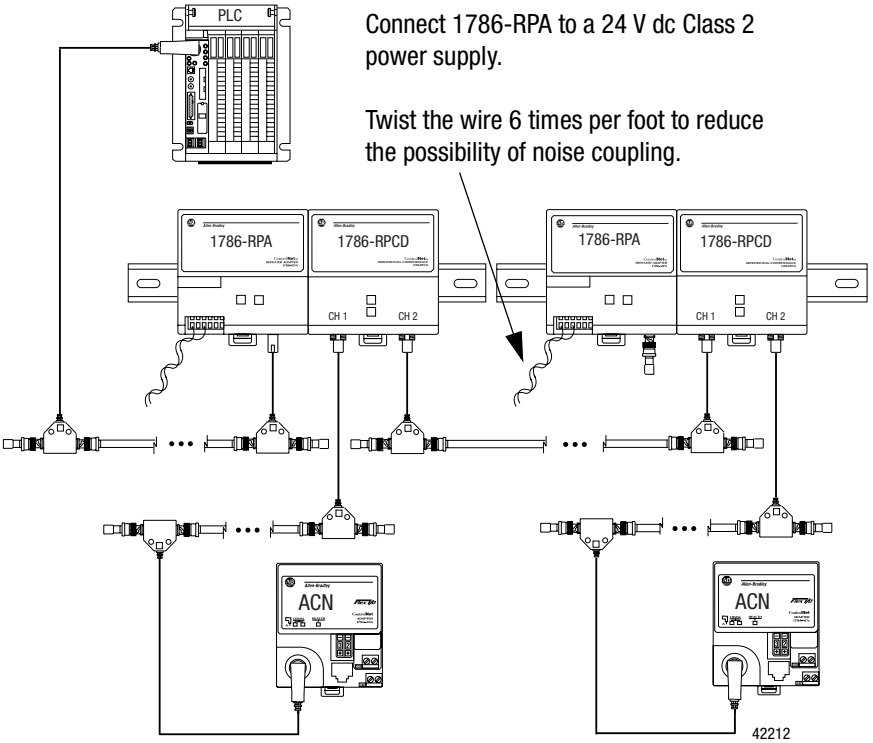
2. Refer to the example topologies on pages 14 through 18.

The 1786-RPCD allows multiple 1000m copper segments with up to five repeaters adapters in a series. Because the 1786-RPCD is part of the ControlNet hub family you are required to use the 1786-RPA. The 1786-RPA supplies power and coordinates the TX and RX function of the modules.

The following topologies provide examples of how you can use the 1786-RPCD.

Series Topology

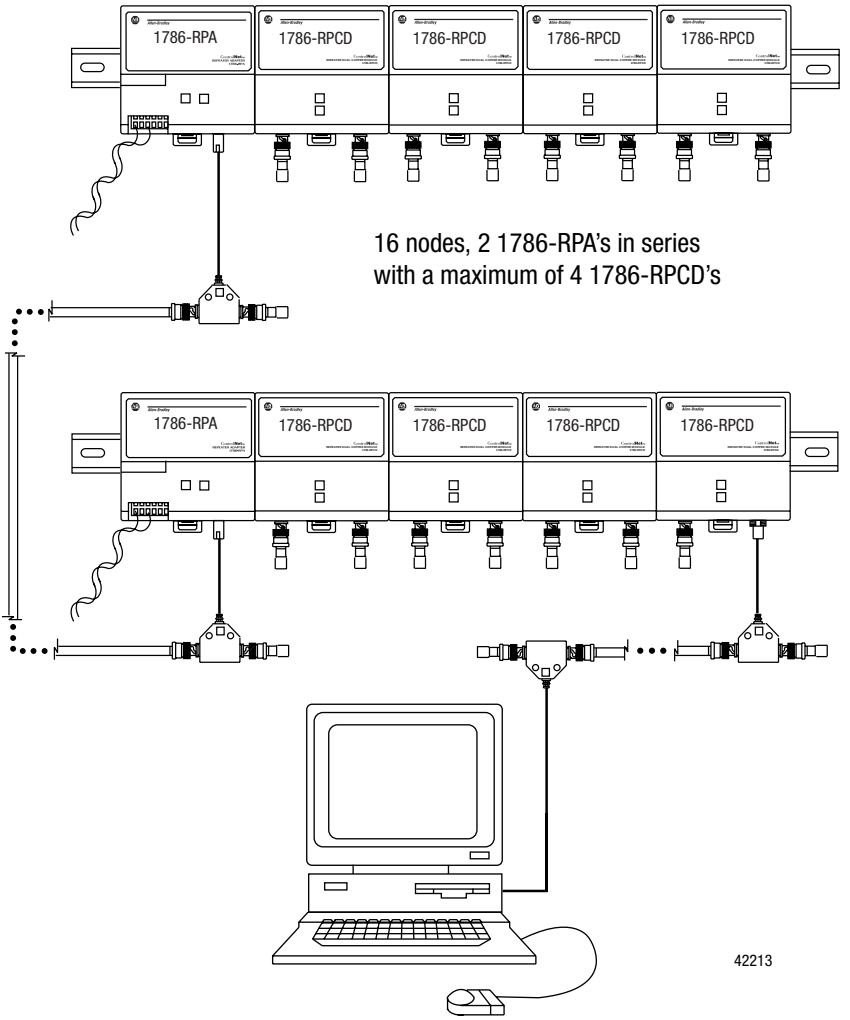
Figure 4 The 1786-RPCD's in a series topology



Star Topology

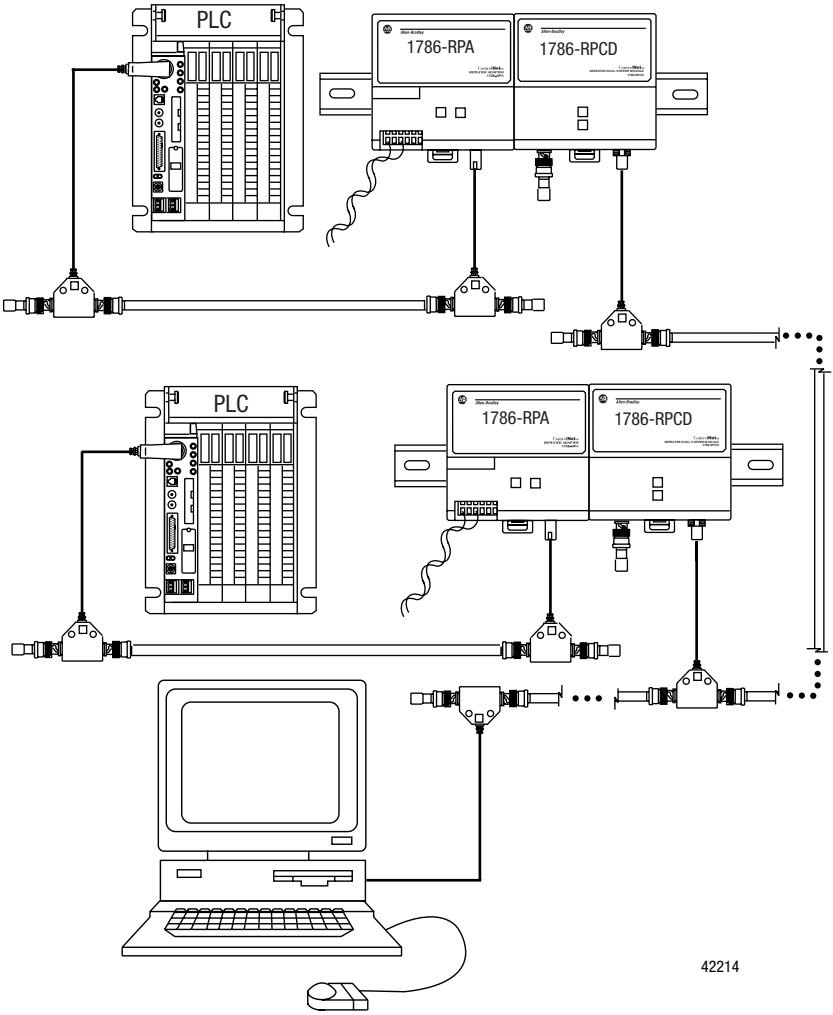
Figure 5 illustrates a star configuration offering a 16 port hub topology.

Figure 5 The 1786-RPCD's in a star configuration



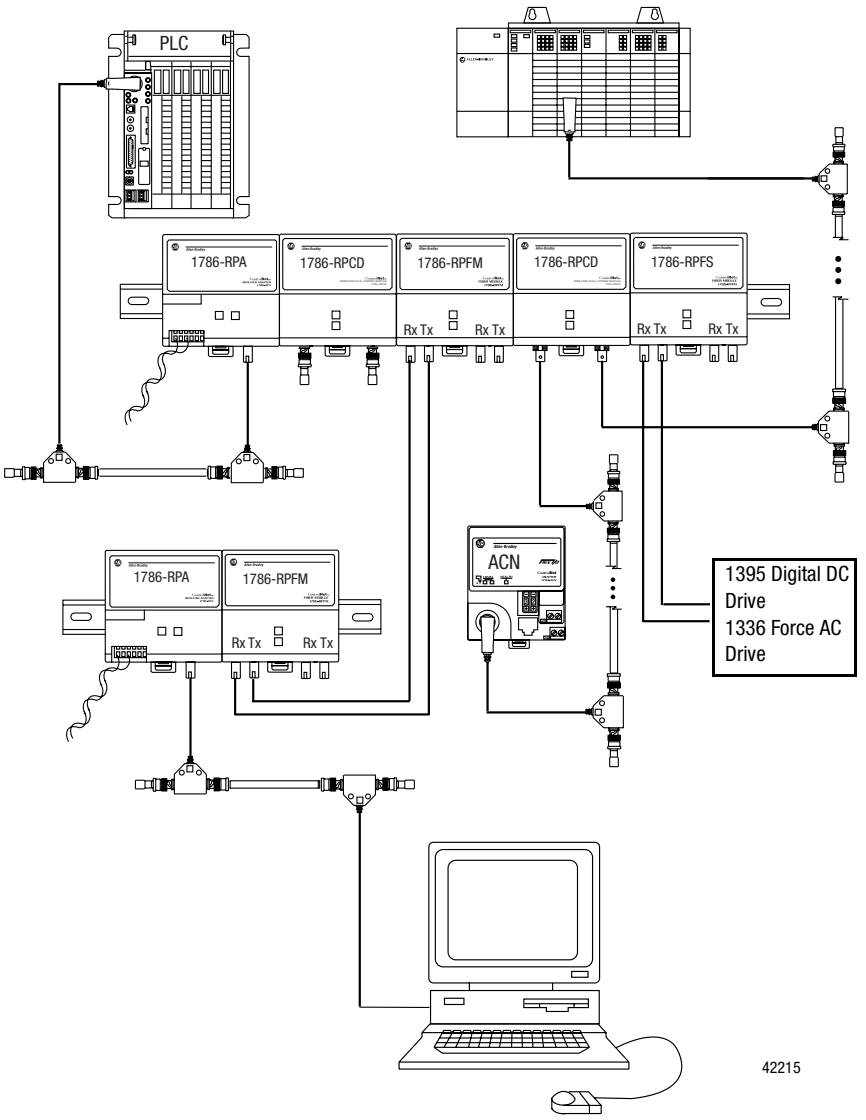
Trunk Extender Topology

Figure 6 Trunk Extender Topology



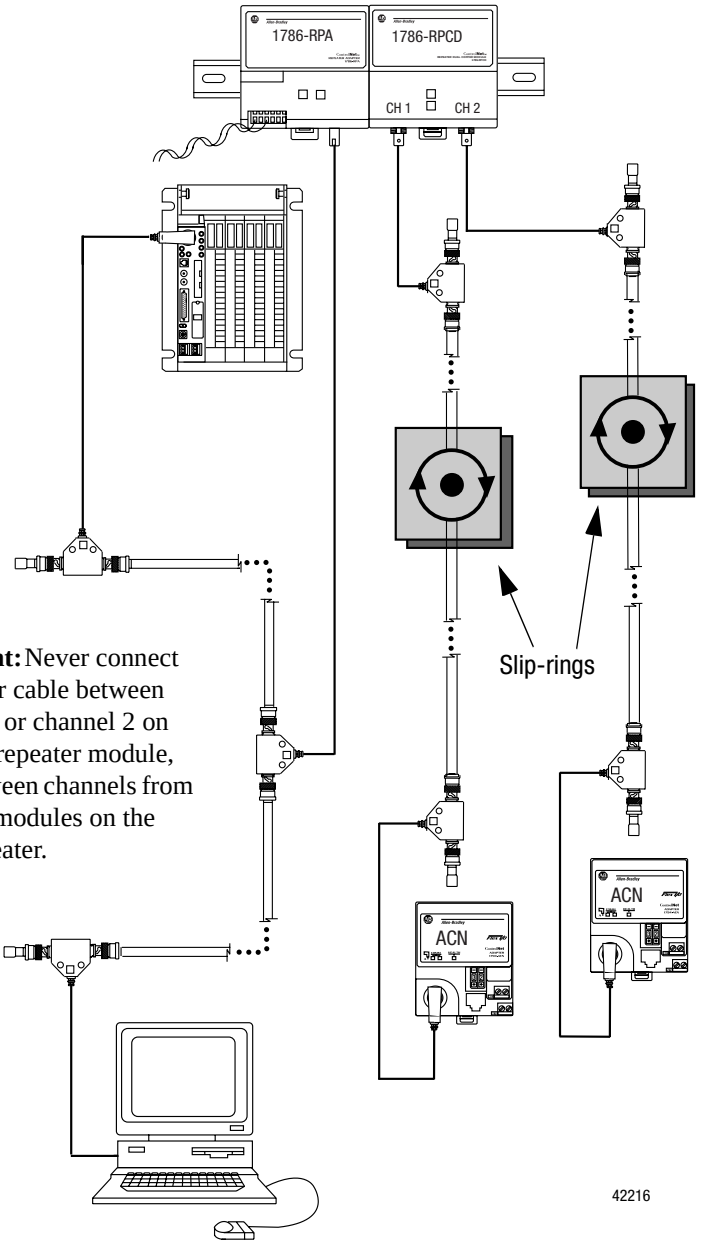
Hub/Star Topology

Figure 7 Hub/Star Topology



Slip-ring Isolation Topology

Figure 8 Slip-ring Isolation Topology

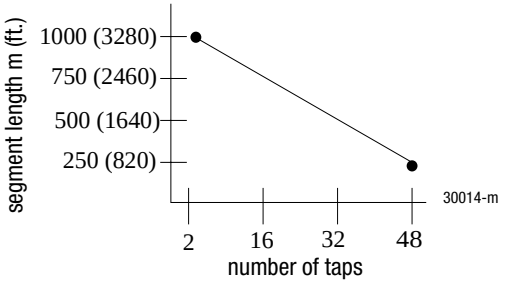


Important: Never connect the copper cable between channel 1 or channel 2 on the same repeater module, even between channels from different modules on the same repeater.

Constraints of the COAX Segment

The total allowable length of a segment that contains standard RG-6 quad shield coaxial cable depends upon the **number of taps** in your segment. There is **no minimum** trunk-cable section length requirement. The maximum allowable total length of a segment is 1000m (3280ft) with two taps connected. Each additional tap decreases the maximum length of the segment by 16.3m (53ft). The maximum number of taps allowed on a segment is 48 with a maximum length of 250m (820ft).

Figure 9 Maximum Segment Length



maximum allowable segment length =
1000m (3280ft) - 16.3m (53.4ft) X [number of taps - 2]

COAX Segment Constraint Example

If your segment requires 10 taps, the maximum segment length is:

1000m (3280ft) - 16.3m (53.4ft) x [10 - 2]
1000m (3280ft) - 130.4m (427.7ft)) = **869.6m (2852.3ft)**

If you install a repeater, you can increase the total trunk-cable length or number of taps. When you install a repeater you create another segment.

The amount of high-flex RG-6 cable (1786-RG6F) you can use in a system is less than the amount of standard RG-6 cable, so you should keep high-flex cable use to a minimum. Use BNC bullet connectors to

isolate areas that require high-flex RG-6 cable from areas that require standard RG-6 cable; this allows the high-flex RG-6 section to be replaced before flexture life is exceeded.

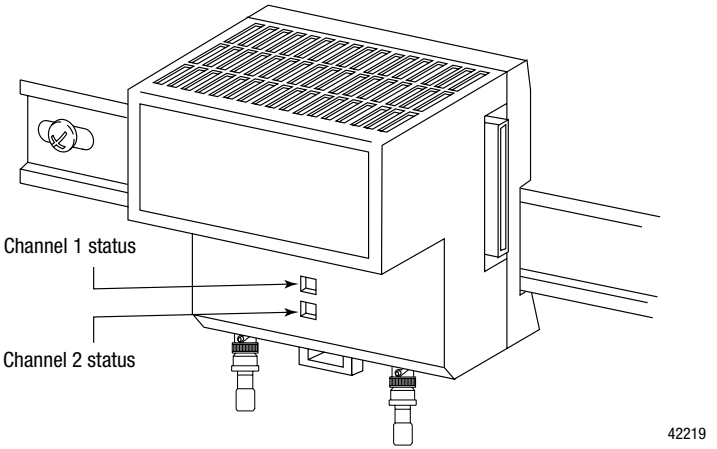
Use this example when the attenuation of the cable (1786-RG6F High Flex) is: 10MH > 5.99dB/1000'

trunk length = 20.29 (# of taps *.32/ COAX attenuation)

For more information on the installation of a coax segment, see the ControlNet Coax Media Planning and Installation Manual, publication CNET-IN002A-US-P.

Status Indicators

The figure below identifies indicators on the module:



The table below defines Channel 1 and Channel 2 status indications:

Status Indicator:	Probable Cause:
Off	No power or module faulted
Green	Channel operational
Flashing Green/Off	No data activity on associated channel

Related Publications

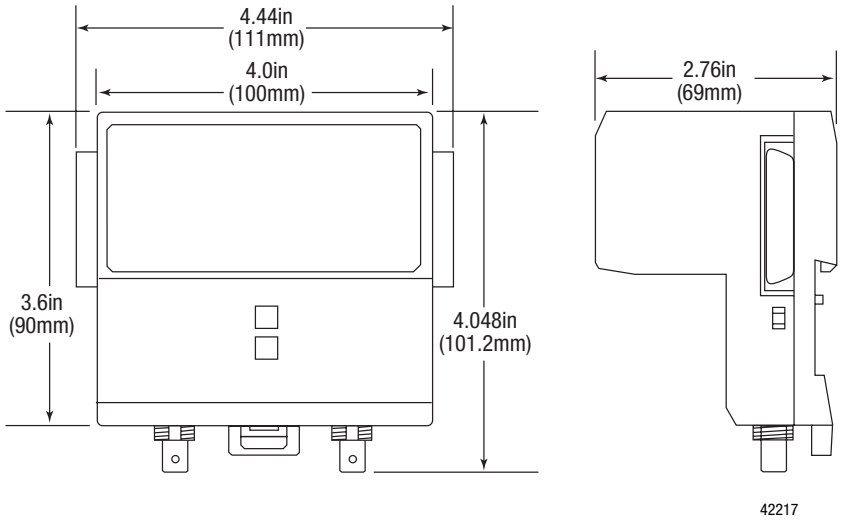
The table below lists publications that you may want to refer to for additional information:

Publication:	Publication Number:
Industrial Automation Wiring and Grounding Guidelines	1770-4.1
ControlNet Coax Tap Installation Instructions	1786-5.7
ControlNet Coax Media Planning and Installation Manual	CNET-IN002A-US-P
ControlNet Cable System Component List	AG-2.2

Mount Dimensions

The figure below provides the mount dimensions for the module.

Figure 10 The 1786-RPCD Mount Dimensions



CSA Hazardous Location Approval

CSA certifies products for general use as well as for the use in hazardous locations. **Actual CSA certification is indicated by the product label** as shown below, and not by statements in any user documentation.

Example of the CSA certification product label

To comply with CSA certification for use in hazardous locations, the following information becomes a part of the product literature for this CSA-certified industrial control product.

- This equipment is suitable for use in Class 1, Division 2, Groups A, B, C, D, or non-hazardous locations only.
- The products having the appropriate CSA markings (that is, Class 1, Division 2, Groups A, B, C, D), are certified for use in other equipment where the suitability of combination (that is, application or use) is determined by the CSA or the local inspection office having jurisdiction.

Important: Due to the modular nature of a programmable control system, the product with the highest temperature rating determines the overall temperature code rating of a programmable control system in a Class1, Division 2 location. The temperature code rating is marked on the product label as shown.

Temperature code rating

The following warnings apply to products having CSA certification for use in hazardous locations.

WARNING: Explosion hazard

- Substitution of components may impair suitability for Class 1, Division 2.
- Do not replace components unless power has been switched off or the area is known to be non-hazardous.
- Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
- Do not disconnect connectors unless power has been switched off or the area is known to be non-hazardous. Secure any user-supplied connectors that mate to external circuits on this equipment by using screws, sliding latches, threaded connectors, or other means such that any connection can withstand a 15 Newton (3.4lb.) separating force applied for a minimum of one minute.
- Batteries must be changed only in an area known to be non-hazardous.

CSA logo is a registered trademark of the Canadian Standards Association.

Approbation d'utilisation dans des emplacements dangreux par la CSA

La CSA certifie les produits d'utilisation générale aussi bien que ceux qui s'utilisent dans des emplacements dangereux. **La certification CSA en vigueur est indiquée par l'étiquette du produit** et non par des affirmations dans la documentation à l'usage des utilisateurs.

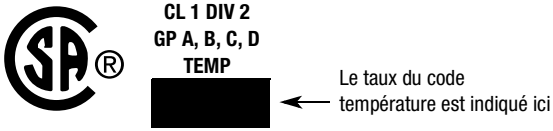
Exemple d'étiquette de certification d'un produit par la CSA.

Pour satisfaire à la certification de la CSA dans des endroits dangereux, les informations suivantes font partie intégrante de la documentation ce produit industriel de contrôle certifié par la CSA.

- Cet équipement convient à l'utilisation dan des emplacements de Classe1, Division 2, Groupes A, B, C, D, ou ne convient qu'à utilisation dans des endroits non dangereux.
- Les produits portant le marquage approprié de la CSA (c'est à dire, Classe1, Division 2, Groupes A, B, C, D) sont certifiés à l'utilisation pour d'autres équipement où la convenance de combinasion (application ou utilisation) est déterminée par la CSA ou le bureau local d'inspection qualifié.

Important: Par suite de la nature modulaire du système de contrôle programmable, le produit ayant le taux le plus éléve de température détermine le taux d'ensemble du code de température du système de contrôle d'un programmable dans un emplacement de Classe 1, Division 2. Le taux du code de température est indiqué sur l'étiquette du produit.

Taux du code de température



Les advertissements suivants s'appliquent aux produits ayant la certification CSA pour leur utilisation dans des emplacements dangereux.

AVERTISSEMENT: Risque d'explosion

- La substitution de compansants peut rendre ce matériel inacceptable pour lesemplacements de Classe 1, Division 2.
- Couper le courant ou s'assurer quel'emplacement est désigné non dangeraux avant de replacer lescomposants.
- Avant de débrancher l'équipement, couper le courant ou s'assurer que l'emplacement est désigné non dangereux.
- Avant de débrancer les connecteurs, couper le courant ou s'assurer que l'emplacement est reconnu non dangereux. Attacher tous connectours fournis par l'utilisateur et reliés aux circuits externes of the appareil à l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens permettant aux connexions de résister à une force de séparation de 15 Newtons (3,4 lb. - 1,5 kg) appliquée pendant au moins une minute.
- Afin d'eviter tout risque d'explosion, s'assurer que l'emplacement est designe non dangereux avant de changer la batterie.

Le sigle CSA est la marque deposee de l'Association des Standards pour le Canada.

Specifications

The table below provides specifications for the module:

Specifications	
Communication Rate	5M bits/s
Indicators	Channel 1 Status - Green Channel 2 Status - Green
Backplane Power Requirements	400 mA @ 5 V dc Class 2 from 1786-RPA
Environmental Conditions	
Operating 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
Shock operating width	30 g peak acceleration, 11(+-1)ms pulse
Non-operating width	50 g peak acceleration, 11(+-1)ms pulse
Vibration	Tested 5 g @ 10-500Hz per IEC 68-2-6
Copper Type	62.5/125 micron
Standard Quad RG6 Cable	
Rockwell Automation	1786-RG6
Belden	3092A
Comm/Scope	5060

Specifications	
Communication Rate	5M bits/s
High Flex RG6 Cable	
Rockwell Automation	1786-RG6F/A and 1786-RG6F/B
Belden	YR28890
Comm/Scope	5060F
Agency Certification (when product or package marked)	Listed Industrial Control Equipment ® Certified Process Control Equipment ® Certified Class I, Division 2, Groups A, B, C, D Marked for all applicable directives Marked for all applicable acts N223

ControlNet is a trademark of ControlNet International

Americas Headquarters, 1201 South Second Street, Milwaukee, WI 53204, USA, Tel: (1) 414 382-2000, Fax: (1) 414 382-4444
European Headquarters SA/NV, avenue Herrmann Debroux, 46, 1160 Brussels, Belgium, Tel: (32) 2 663 06 00, Fax: (32) 2 663 06 40
Asia Pacific Headquarters, 27/F Citicorp Centre, 18 Whitfield Road, Causeway Bay, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

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