

The Application Note is pertinent to our CTNet Products

CTNet Revision Frequently Asked Questions

Background: The improvements and changes with CTNet that have accompanied the introduction of the SM-Applications module for the Unidrive-SP has resulted in a need for all CTNet Users be aware of a number of issues. This document addresses these issues in the format of a series of “**Frequently Asked Questions**”.

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What is CTNet ?

CTNet is a fieldbus standard developed by Control Techniques for the interconnection of a collection of drive option modules and stand-alone products for the purpose of implementing distributed control applications. CTNet is particularly strong in its deterministic and peer-to-peer capabilities, and is complemented with a powerful programmable second processor.

A CTNet network is comprised of a single segment or more than one segment, with multiple segments linked together by a repeater or a hub. A typical layout of a CTNet network is shown in Figure 1-1.

Each segment has a termination resistor fitted at each end, and each segment meets limits regarding data rate, number of nodes and segment length determined by the CTNet hardware revision.

In general, every CTNet network starts out with each component at the same CTNet hardware revision, or at compatible revision levels.

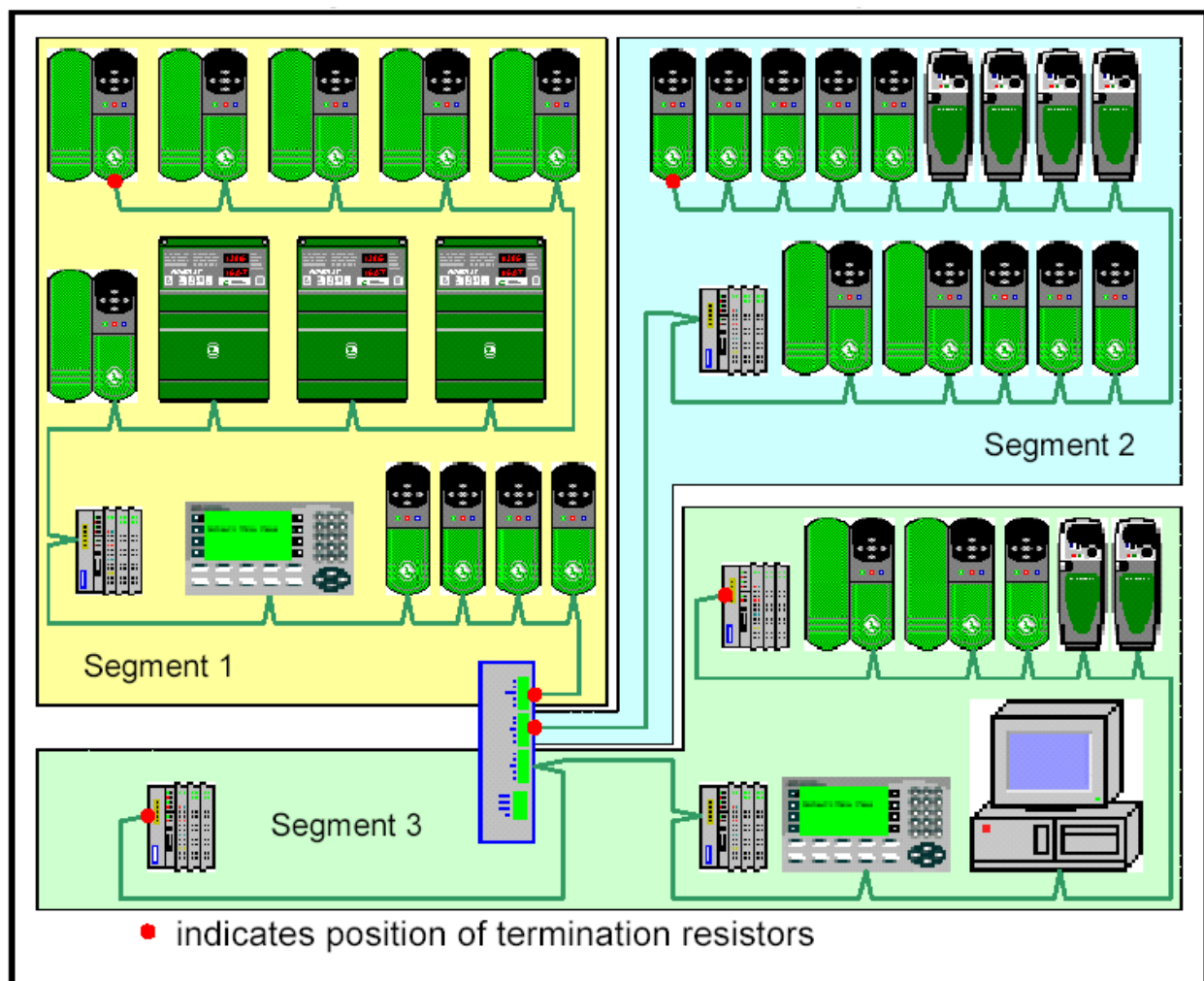


Figure 1-1 Example CTNet network layout

What is CTNet Rev D ?

CTNet Rev D is the latest and most up-to-date revision of the CTNet “transmission layer” hardware. This standard was introduced with the SM-Application module for the Unidrive-SP. CTNet for Unidrive-SP is only available at the CTNet Rev D standard.

CTNet Rev D hardware has been introduced to improve the overall performance of CTNet, and all CTNet Rev D devices are marked with the new CTNet conformance logo. CTNet Rev D hardware uses an improved output driver stage to give higher voltage pulses, and a higher impedance input stage to reduce the load applied to the network by each node. The overall effect is to increase the number of nodes and/or total length of cable that be used for a single network segment. The maximum permitted cable length can also be increased by reducing the number of nodes on a segment, and vice versa.

CTNet Rev D hardware allows a mathematical model to be applied to a segment design to determine if the combination of nodes and cable length is within the CTNet specifications for the required data rate. The model covers data rates of 5.0 Mbit/s, 2.5 Mbit/s and 1.25 Mbit/s.

The new CTNet Rev D hardware revision parts are marked with the compliance logo.



What is CTNet Rev C ?

CTNet Rev C is an intermediate, transitional revision of the “transmission layer” hardware that is compatible with CTNet Rev D, but retains some of the previous CTNet Rev B hardware.

CTNet Rev C hardware uses identical output driver and input receiver stages as CTNet Rev D hardware, but it uses the CTNet Rev B pulse transformer. The lower inductance of the previous-style pulse transformer means that fewer CTNet Rev C nodes can be connected to a CTNet segment than a segment consisting only of CTNet Rev D devices.

CTNet Rev C and CTNet Rev D devices can be mixed on a network segment without problem, but the higher loading factor of CTNet Rev C hardware must be taken in to account when checking the overall design of the CTNet segment.

The CTNet Rev C hardware revision parts are also marked with the  compliance logo.

What is/was CTNet Rev A and CTNet Rev B ?

Hardware Rev A

CTNet Rev A was the original revision of the CTNet “transmission layer” hardware. This standard was introduced with the original MD29AN iss1 and UD75 in July of 1996.

CTNet Rev A used a diode-receiver stage to convert the pulses from the network to a digital bit-stream. This hardware design was also used in the PC Cards, Hubs and Repeaters supplied to use by Contemporary Controls. CTNet Rev A hardware can drive 10 other nodes over 100m of cable at 2.5 Mbit/s, although PC Cards are only capable of driving 6 other nodes due to internal circuit differences.

Hardware Rev B

CTNet Rev B was an improvement to the CTNet “transmission layer” hardware. This standard was introduced with the UD75A issue 3 in March of 1998.

The diode-receiver stage was replaced with a resistive receiver stage and the pulse driver stage was improved to provide higher voltage output pulses. Rev B hardware can drive 15 other nodes over 100m of cable at 2.5 Mbit/s.

Note!

The maximum number of nodes and length of cable permitted on a network segment are determined by the "weakest" node on the segment. While Unidrive (UD75-CTNet) had been updated to CTNet Rev B hardware with the introduction of the UD75A Issue 3, and the CTNet I/O Coupler was originally designed with Rev B hardware, the “weakest link” on a communications network determines the overall maximum guaranteed capabilities of the segment. So, as soon as a PC card, Hub or Repeater (at CTNet Rev A “transmission layer” hardware) was / is connected to a network segment with CTNet Rev B hardware, the benefit of having CTNet Rev B hardware was / is lost.

Why is CTNet Rev D (and CTNet Rev C) important to CTNet Users ?

The change in the “transmission layer” hardware standard for CTNet results in both advantages and disadvantages for the CTNet user. The improvement in network performance, scalability and predictability at the same (or better cost*) has been weighed against the loss of (direct) compatibility with the previous revisions, and the logistic complications for users with existing hardware. Control Techniques believes the advantages outweigh the disadvantages, and one of the goals of this FAQ is to provide enough information to the CTNet user community to work around the difficulties that two (incompatible) standards create.

If and when the CTNet Rev B and / or CTNet Rev A revision parts are no longer available at some time in the future, this FAQ should also prove helpful.

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Note: As of the time of this publication, the price for the SM-Apps (with Revision D CTNet) is significantly less than the price for either version of the UD-75 module (CTNet Rev B and CTNet Rev D).

Which CTNet revisions work together on the same network segment (by design)?

CTNet Rev **D** and CTNet Rev **C** are designed to be compatible and inter-operate on the same network segment.

CTNet Rev **B** and CTNet Rev **A** are also designed to be compatible and inter-operate on the same network segment.

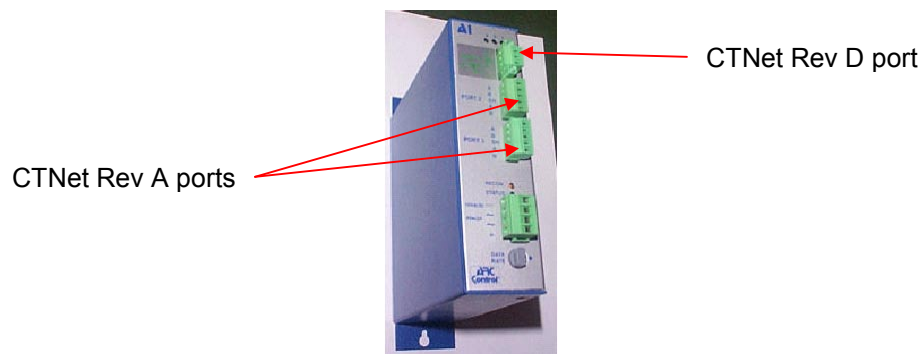
CTNet Rev D (and CTNet Rev C) is **not** designed to be compatible with CTNet Rev B or with CTNet Rev A. What this means is:

1. Replacing a CTNet Rev D (or CTNet Rev C) node on a working network segment with a CTNet Rev B or a CTNet Rev A node will cause that network segment to stop working.
2. Replacing a CTNet Rev B (or CTNet Rev A) node on a working network segment with a CTNet Rev D or a CTNet Rev C node will cause that network segment to stop working.
3. Adding a CTNet Rev D (or CTNet Rev C) node on a working network segment with functioning CTNet Rev B node(s) and / or CTNet Rev A node(s) will cause that network segment to stop working.
4. Adding a CTNet Rev B (or CTNet Rev A) node on a working network segment with functioning CTNet Rev D node(s) and / or CTNet Rev C node(s) will cause that network segment to stop working.

What guidelines apply to a combination of CTNet Rev B/A and CTNet Rev D/C in the same system ?

The official position by CT Engineering and CT Product Support is that CTNet Rev D (and Rev C) devices are incompatible with CTNet Rev B (and Rev A) hardware on the same network segment, and do not work together. This incompatibility is a result of different logic thresholds (where the logic state “0” and the logic state “1” is detected) between these two standards.

The official answer to a need to use both CTNet Rev B (and Rev A) devices on a system with CTNet Rev D (and Rev C) devices is to use the CTNet Hybrid Hub and connect the respective parts to the proper port on the hub (i.e. put the devices on separate, compatible segments, and bridge them with the CTNet Hybrid Hub).



**CTNet Hybrid Hub
(AI3-485X-CT)**

Laptop CTNet Users (a special case)

CTNet users working with a laptop fitted with PCMCIA / CARDBUS CTNet interfaces often need to work with different CTNet “transmission layer” revisions, at different times, as they are often working with different distributed control systems implemented with CTNet. This can result in “mixed revisions” when the laptop is moved and connected to a different CTNet based system.

The newer PCM20H PCMCIA CTNet Interface has a separate MAU that determines the CTNet “transmission layer” revision. Note that the PCM20H card with Contemporary Controls labels is identical to the PCM20H card with Control Techniques CTNet labels. As the CTNet “transmission layer” hardware revision is determined by the MAU, the revision of the PCMCIA Kit can be changed between Rev A and Rev D “transmission layer” hardware by simply swapping between a MAU20H-CT MAU and MAU20H-485X MAU.

PCM20-485X	PCM20H-485X	PCM20H-CT
4500-0030 (Obsolete)	4500-1030	4500-0086
Rev A	Rev A	Rev D 
		

CTNet PCMCIA / Cardbus Interfaces (with MAU, where applicable)

For those CTNet users that have a PCM20 card and plastic MAU, there is no upgrade route. A new PCMCIA Card and MAU (PCM20H-CT, Part No. 4500-0086) are required to allow a PC to be connected to a segment consisting entirely of Rev D and/or Rev C devices.

For those CTNet users that require the ability to connect to any CTNet networks, the preferred solution is to purchase a Rev A MAU (MAU20H-485X) in addition to the PCM20H-CT “Kit” and simply connect to the CTNet network using the appropriate MAU.

A Final Note

There is one, useful exception to not mixing CTNet Rev A with CTNet Rev D. During the evaluation of the first (beta) SM-Apps modules for the Uindrive-SP, it was discovered that a single PCM20-485X (a CTNet Rev A device) would function with a SINGLE SM-Apps Module (this was a beta, CTNet Rev D device). Adding a second CTNet Rev D device to the segment resulted in unreliable operation. This (not officially supported) scenario can be useful to a SyPT developer or a salesman demonstration a single Unidrive-SP with a laptop.

How do I identify one CTNet revision from another by inspection ?

With Logo

Currently manufactured CTNet hardware with a “**CTNet**” conformance logo displayed, are either at the CTNet Rev **D** or at the CTNet Rev **C** “transmission layer” hardware level.



CTNet Conformance Logo

For CTNet products displaying the logo:

The following conforming products were originally released at the CTNet Rev D standard, and remain at that “transmission layer” hardware level:

- Unidrive-SP - SM-Applications
- Mentor II / Quantum III - MD29AN Rev D
- Unidrive UD75-CTNet Rev D
- AI3-CT hub - CTNet 3-port Hub
- CTNet PC interface (including PCMCIA Cardbus) cards
- AI3-485X-CT CTNet “Hybrid Hub” 1-CTNet Rev D port and 2-CTNet Rev A ports

The following product was originally released at the CTNet Rev C standard, and remains at that “transmission layer” hardware level:

- SmartStack Rev C - CTNet CTIU200 HMI SmartStack Interface

The following product was originally released at the CTNet Rev C standard, and later updated to the CTNet Rev D standard. These units and must be inspected further to determine the “transmission layer” hardware revision.

- BK7200 CTNet I/O Coupler

No Logo

Currently manufactured CTNet hardware that is NOT marked with a “**CTNet**” conformance logo are either at the CTNet Rev A or at the CTNet Rev B “transmission layer” hardware level.

For CTNet products not displaying the logo

The following products were originally released at the CTNet Rev A standard, and remain at that “transmission layer” hardware level:

- Mentor II / Quantum III - MD29AN
- AI2-485X CTNet 2-port Repeater
- AI3-485X - CTNet 3-port Hubs
- CTNet PC interface (including PCMCIA Cardbus) cards.

The following products were originally released at the CTNet Rev B standard.

- BK7200 Rev B CTNet I/O Coupler
- SmartStack Rev B - CTNet CTIU200 SmartStack

The following product was originally released at the CTNet Rev A standard, and later updated to the CTNet Rev B standard. These units and must be inspected further to determine the “transmission layer” hardware revision.

- Unidrive UD75 - CTNet

Why would I specify / order a CTNet Rev A or Rev B Part ?

The primary reason a CTNet user would specify and / or order a previous generation CTNet revision part is to keep on hand as a spare for an control system that has one or more network segments with CTNet Rev A or Rev B devices (i.e. to replace an existing unit that has failed).

Note that a number of the CTNet products also include second processor that may contain third party custom logic in the form of a compiled SyPT or DPL program. For guidance in evaluating such logic for the MD29AN and UD75 versions of these products, see [CTAN 219](#).

Also note that it is not necessary to specify the exact Revision for Rev A or Rev Parts. The only product that was released at CTNet Revision A and later upgraded to Revision B was the Unidrive UD75, and this option is now only available for purchase as a CTNet Rev B product.

How do I specify / order a replacement CTNet Rev B (or Rev A) part ?

The following table cross-references the present CTNet Revision B and CTNet Revision A products and cross-references the CT Part numbers to the US Catalog Part Numbers.

CTNet Users that order parts through the North American Distribution or directly from the North American Drive Centers will use the US Catalog part numbers. CTNet Users Worldwide will find the CT Part numbers useful for specifying and ordering these products.

Device	Reference	CT Part Number	US Catalog Part Number
Unidrive	UD75-CTNet Rev B	80700000005700	UD75
Mentor II	MD29AN Rev A	80100000006200	MD29AN
CTNet I/O Coupler	BK7200 Rev B	4500-0028	SSP7200
CTNet CTIU200 SmartStack	SmartStack Rev B	4500-0007	SSP-2050-0900
CTNet PCI Card	PCI20/5-485X	4500-0034	CTNet-PCI
CTNet PCMCIA Card kit	PCM20H-485X	4500-1030	CTNet-PCMCIA-5
CTNet Rev A MAU only	MAU20H-485X	4500-0092	CTNet-MAU-RevA
CTNet ISA Card	PCX20-485X	4500-0029	CTNet-ISA-5
CTNet Repeater	AI2-485X	4500-0031	3000-0003
CTNet Fibre Optic Repeater	AI2-485X/FOG-ST	4500-0032	3000-0004
CTNet Hub	AI3-485X	4500-0033	3000-0005

How do I specify / order a replacement CTNet Rev D (or Rev C) part ?

The following table cross-references the present CTNet Revision D and CTNet Revision C products and cross-references the CT Part numbers to the US Catalog Part Numbers.

CTNet Users that order parts through the North American Distribution or directly from the North American Drive Centers will use the US Catalog part numbers. CTNet Users Worldwide will find the CT Part numbers useful for specifying and ordering these products.

Device	Reference	CT Part Number	US Catalog Part Number
Unidrive	UD75-CTNet Rev D	80700000005701	UD75-RevD
Unidrive SP	SM-Applications	82000000011400	SM-Applications
Mentor II	MD29AN Rev D	80100000006201	MD-29AN-RevD
CTNet I/O Coupler	BK7200 Rev C	4500-0089 (obsolete)	SSP7200-RevC
CTNet I/O Coupler	BK7200 Rev D	4500-0094	SSP7200-RevD
CTNet CTIU200 SmartStack	SmartStack Rev C	4500-0088	CTIU200-CTNet-RevC
CTNet PCI Card	PCI20-CT	4500-0085	CTNet-PCI-RevD
CTNet PCMCIA Card kit	PCM20H-CT	4500-0086	CTNet-PCMCIA-RevD
CTNet Rev D MAU only	MAU20H-CT	4500-0090	CTNet-Mau-RevD
CTNet ISA Card	PCX20-CT	4500-0084	CTNet-ISA-RevD
CTNet Hub	AI3-CT	4500-0082	CTNet-Hub-RevD
CTNet Hybrid Hub	AI3-485X-CT	4500-0083	CTNet-Hybrid-Hub
CTNet Fibre Optic Repeater	AI2-CT/FOG-ST	4500-0081	CTNet-FIB-RevD

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