



COPPER-T EXTENDER

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1. DESCRIPTION

The DCE Copper-T Extender is a 4-wire repeater for use on customer owned lines or to extend telephone company lines. The Extender is used to extend in-house T-1 lines in campus and high-rise environments.

Each pair of T-1 Extenders may be located up to 5000 feet apart. The Extender circuitry is rated to -36 dB dynamic range at the T-1 rate of 1.544 Mbps. As implemented, the parts are slightly de-rated to provide long life at extended temperature range. Therefore the distances specified in this document are only 5000 feet. Solid copper 22 AWG, two twisted pair is the preferred cable for connection between the Extenders. Connection to the Extender is made through RJ48 modular connectors or 4-wire screw down terminal blocks. Each Extender comes standard with two screw down terminal blocks and two RJ48 adapters. Extra RJ48 adapters (part number 9502122 to connect to telco, 9502172 to connect to customer equipment) can be ordered.

The DCE Copper-T Extender is powered by a small wall-mount transformer. The Extender is designed for connections between T-1 equipment such as PBXs, T-1 multiplexers, T-1 line drivers, CSUs, routers or any other T-1 equipment requiring long customer owned cable runs. T-Extenders can be used to connect this equipment across a campus, between floors of a high-rise office building or between office buildings with underground cable runs. The COOPER T is transparent to the type of data sent over the T-1 link. The data can be D-4 format, ESF, PRI, G.703, G.704, etc.

The COPPER-T Extenders are most often used in pairs to extend a telephone company demarc. For example, if a CSU or DSU is limited to 655 feet and is connecting to a phone company smart jack demarc which is limited to 655 feet, the T-Extenders are used in pairs to extend that distance up to 5000 feet.

Features

- Actively repeats the T1 and E1 signals
- RJ48 or screw down connectors
- Power options 120 or 240 VAC; 12, 24, 48, or 125 VDC
- 1U high rack mountable, 1, 2, or 3 x 19" rack
- 20 slot rack chassis option
- DIN mount option

2. SPECIFICATIONS

2.1 General

T-1 repeater

Extends T-1 bi-polar signals

Up to 5000 feet between T-Extenders

Indicators

Power

Accessories

RJ48 wiring adapters P/N 9502122 and 9502172 (included)

RJ45 to RJ45 straight through cable P/N 9500095

RJ45 to RJ45 crossover cable P/N 9500099

Rack shelf, 1U for 1 to 3 T-Extenders

20 slot, 4U high 19" rack mount chassis

2.2 T1

Tx Output Level: 0.5dBdsx, 17.0dBm, 6.3v p-p

Rx Input Sensitivity: -36dB

2.3 Wire

Two twisted pair solid copper

2.4 T1 In and Out Connections

RJ48 modular	9502122	9502172
Pin 1 - In	Receive	Transmit
Pin 2 - In	Receive	Transmit
Pin 4 - Out	Transmit	Receive
Pin 5 - Out	Transmit	Receive

4-Wire terminal block

Receive - In

Receive - In

Transmit - Out

Transmit - Out

Connect the transmit pair of one Extender to the receive pair of the other Extender. Pairs are not polarity sensitive. Units are supplied with 2 screw down and 2 RJ48 adapter connectors (one each 9502122 and 9502172)

2.5 Physical/Electrical

5.5" x 7.5" x 1.5"

100 ohm T-1, 120 ohm E-1 interface

2 lbs including wall transformer

120 VAC external wall transformer supply

Optional 220 VAC, 12, 24, 48, 125 VDC

30 ma

2.6 Environmental

-40 to +70 C operating temperature

3. INSTALLATION

3.1 Unpacking

The following is included with each unit:

- Unit and external power supply
- Two RJ48 to terminal block adapters. One provides an equipment interface the other provides a network interface.
- Manual
- Information regarding warranty, maintenance contracts and repair

3.2 Location

Place the unit in a clear area where you can reach the rear panel to connect the cables. The unit has an external power supply that requires a 120 VAC outlet. The total power cord length is about 6 feet.

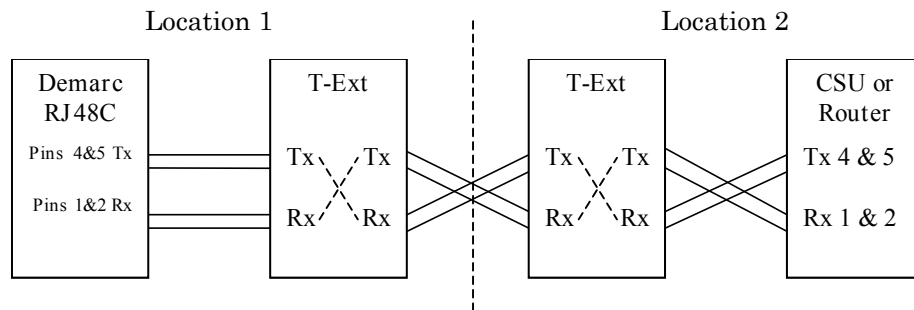
3.3 Connections

On the unit, **transmit is an output, receive is an input**. When connecting units to each other, the transmit of one unit must be connected to the receive of the other. Pairs are not polarity sensitive. See Section 5 for connector pinouts.

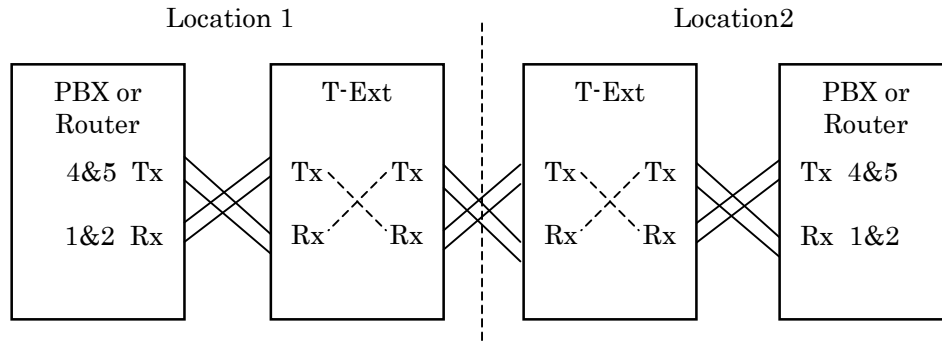
Cables for connecting the units to the telco demarc and a DSU/CSU or router are available from DCE. See Section 5 for part numbers.

NOTE

Cable should be Category 3, 2 twisted pair, shielded. **DO NOT** use Category 5 cable unless absolutely necessary. If Cat 5 cable must be used, use separate bundles for the Tx and Rx pairs.



Connections for most applications.



Equipment to Equipment connections.

The supplied RJ48 adapters allow all of the above connections to be made using straight through wired RJ to RJ cables (patch cords).

For connection to a TELCO Demarc use the adapter labeled “To TELCO Net”, P/N 9502122 (green circuit board).

To make the crossover connection between two T/E-Extenders use adapter “To TELCO Net”, P/N 9502122 on one unit and P/N 9502172, “To Cust Equip” (blue circuit board) on the other.

To connect to customer equipment such as a Router, DSU or PBX, use the adapter labeled “To Cust Equip”, P/N 9502172 (blue circuit board).

NOTE

If making an equipment to equipment connection you will need to order one additional RJ48 adapter, P/N 9502172, “To Cust Equip”, (blue PCB).

OR

Use the terminal block connectors for connection between units.

4. FRONT PANEL INDICATORS

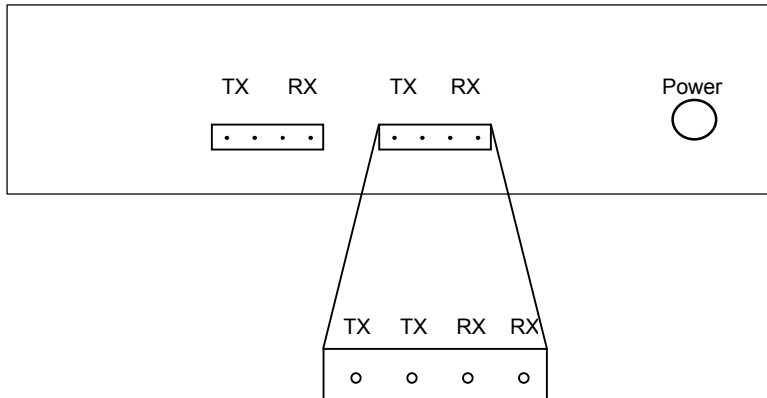
4.1 Indicators

<u>Indicator</u>	<u>Condition</u>	<u>Meaning</u>
Power	ON	Power is applied to the unit.

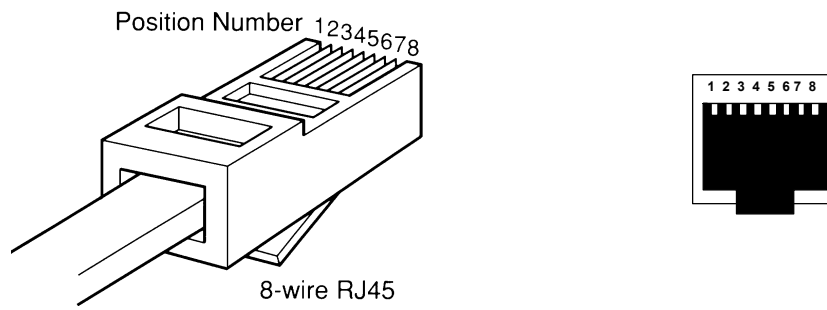


5. INTERFACE SIGNALS AND CABLES

5.1 Connector Location and Pin Reference



Rear Panel and Connectors



RJ45 Positions

5.2 T-1 Interface

5.2.1 Terminal Block

	<u>Signal</u>	<u>In/Out</u>
Receive		IN
Receive		IN
Transmit		OUT
Transmit		OUT

5.2.2 RJ48 Adapter, "To TELCO Net" P/N 9502122 (Green)

<u>Pin</u>	<u>Signal</u>	<u>In/Out</u>
1	Receive	IN
2	Receive	IN
3	not used	
4	Transmit	OUT
5	Transmit	OUT
6	not used	
7	not used	
8	not used	

Use this adapter and a straight through cable to connect to a TELCO Demarc (Network) interface.

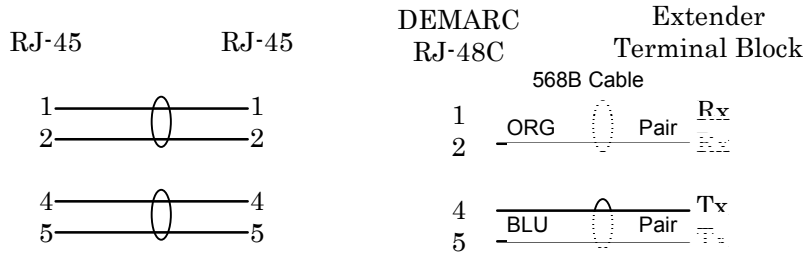
5.2.3 RJ48 Adapter, "To Cust Equip" P/N 9502172 (Blue)

<u>Pin</u>	<u>Signal</u>	<u>In/Out</u>
1	Receive	OUT
2	Receive	OUT
3	not used	
4	Transmit	IN
5	Transmit	IN
6	not used	
7	not used	
8	not used	

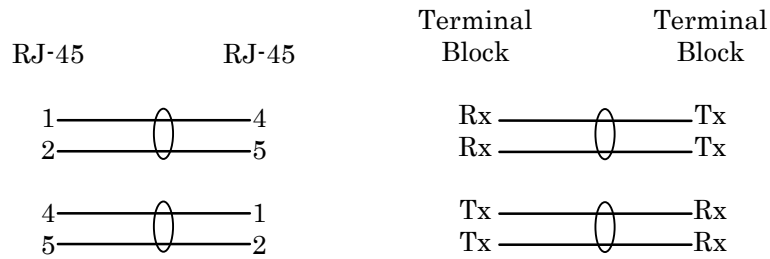
Use this adapter and a straight through cable to connect to an Equipment (DSU, Router, PBX, etc.) interface.

5.3 Cables

5.3.1 Extender to TELCO Demarc using RJ48 adapter 9502122.
This cable is available from DCE, P/N 9500095.



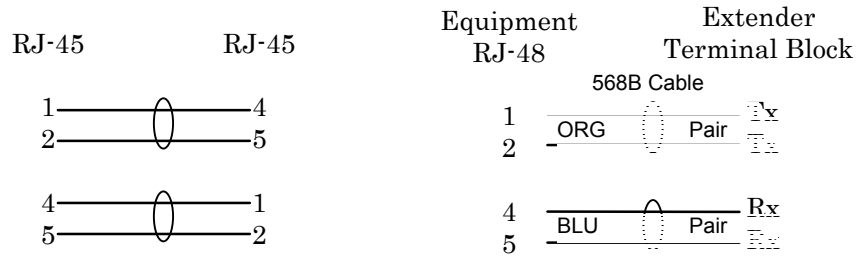
5.3.2 Extender to another Extender using RJ48 adapter 9502122 on both.
This cable is available from DCE, P/N 9500099.



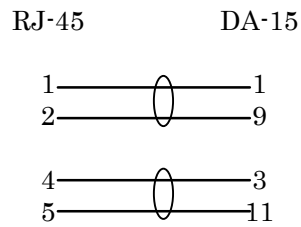
NOTE

If one adapter 9502122 and one 9502172 are used then this connection can be made using straight through RJ to RJ wiring.

5.3.3 Extender to a DSU/CSU, PBX or Router with RJ48 interface using RJ48 adapter 9502122. This cable is available from DCE, P/N 9500099.



5.3.4 Extender to a DSU/CSU with DA-15 interface



5.3.5 Sources for Individually Shielded Twisted Pair Cable:

Beldon # 7838A

Comm Scope # 21102D

General Cable # 7056880

Madison Cable # 14035

Quabbin Wire & Cable # 9770

6. TROUBLESHOOTING

6.1 General Approach

When troubleshooting problems, a rational plan can save you many hours of frustration. The following is a brief outline of standard troubleshooting procedures.

1. Gather the facts to determine the exact nature of the problem.
2. Draw a picture of the system showing the equipment at both ends and the in-house wiring. Use this as a reference to note your observations, test steps and test results. A picture keeps you focused and often saves duplicate effort.
3. If you change anything, change only one thing at a time.

6.2 Common Problems

The most common problems when installing T-Extenders are wiring problems. Wiring problems fall into two categories; incorrect cable type and improper connections.

We recommend using Category 3, two twisted pair, shielded cable. Category 5, 5e, or 6 cable should not be used. If cat. 5 cable must be used, it is recommended that one pair be used from each of two separate cat. 5 cables to minimize cross-talk (NEXT).

When connecting T-Extenders be sure that outputs are connected to inputs and inputs are connected to outputs. See diagram on page 4 and interface information in Section 5.

6.3 Assistance

If you need assistance troubleshooting your system, contact DCE customer support at 301-924-7400 ext. 25 between 8:00 am and 5:00 pm eastern time Monday through Friday.

7. WARRANTY

DCE products are warranted to be free of defects in materials and workmanship for two years. Data Connect Enterprise will repair or replace any equipment proven to be defective within the warranty period. All warranty work is F.O.B. Olney, MD. This warranty is exclusive of abuse, misuse, accidental damage, acts of God or consequential damages, etc. DCE liability shall not exceed the original purchase price.

All equipment returned for warranty repair must be accompanied by a Returned Material Authorization (RMA) number. To receive an RMA number, call 301-924-7400 ext. 17 between the hours of 8AM and 5 PM eastern time. Equipment must be shipped prepaid to DCE and will be returned at DCE's expense.

Ship returned items to:

Data Connect Enterprise.
3405 Olandwood Court
Olney, Maryland 20832
301-924-7400

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