



"Results You Can Count On"

Reference Manual

**Model VxT-48-DC+
xTalk Emulator
for Vectored VDSL2 Testing**

Rev -



Date of Publication: 9/02/2014

*Automated Performance Testing Solution for VDSL2 Vectoring
Standards-Based Testing per TR-249/WT-249*



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1.0 Introduction

1.1 The VxT-48-DC+

The VxT-48-DC+ is a component of Telebyte's TR-249 Issue 1 and WT-249 Issue 2 Physical-Layer Testing Solution. It integrates with the Model 4901 Multi-Output Noise Simulator to add complex noise such as Alien Crosstalk, RFI and impulse as well as our VxT-N48 AWGN Noise Generator/Injector. It is the world's first commercially available, standards-based solution for testing of equipment that utilizes VDSL2 Vectoring technology. The VxT-48-DC+ offers repeatable and configurable Vectoring performance and is ideal for parallel testing to ensure consistent performance from site to site.

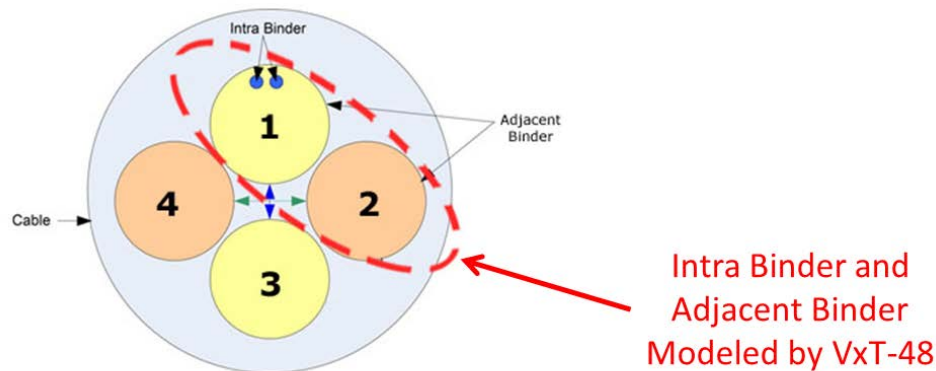
- The TR-249 and WT-249 revision numbers and dates provided in the publication are as of the date of printing.

1.2 Emulation

The Model VxT-48+ xTalk Emulator for Vectored VDSL2 Testing emulates the symmetric model of the ATIS Multiple-Input Multiple-Output (NIPP-NAI-2009-014R3) on 48 channels (using the upper-left 48 x 48 quadrant of the 100 x 100 random-drawn matrix). It also models crosstalk between xDSL multi-pairs within a cable binder and is sufficient for automatically running test cases for systems with Vectoring capabilities. The simulation accuracy is principally focused on the attenuation of the direct and crosstalk paths rather than the phase/delays.

The crosstalk channel transfer function accuracy is based on FEC coupling transfer function as defined in ATIS-PP-0600024_MIMO_Channel_Model_NIPP-NAI-2009-014R3 with the random drawn matrix for amplitude offset.

The coupling between the pairs is realized using fixed coupling elements between pair [i] and pair [j] for [i],[j] = 1,...,48. The VxT-48+ provides independent control of 48 channels. The majority of coupling paths in the VxT-48+ have higher crosstalk than which is specified in the ATIS model. However, it remains compliant with the crosstalk accuracy specified in TR-249 Issue 1.





1.3 Test Loops

The line section emulates the insertion loss of the following loops:

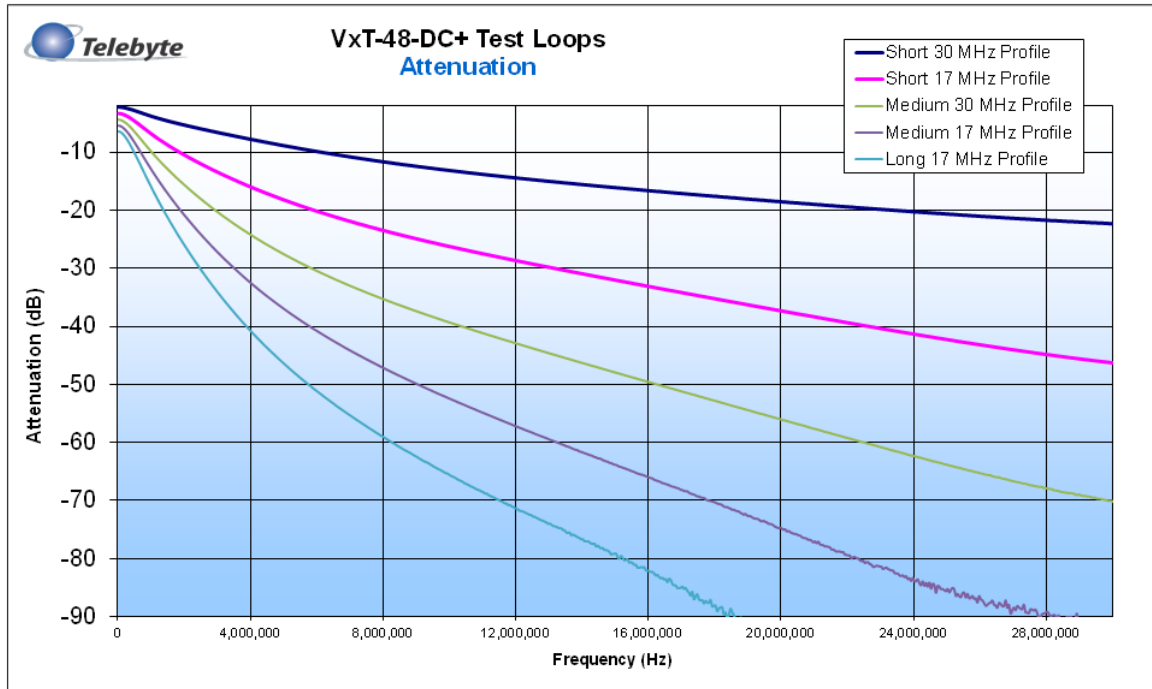
Test Loop	Attenuation at 1 MHz	Examples
WT-249 Issue 2 (Rev 1) Short loop (30 MHz profile)	3.75 dB	150 m / 0.4 mm PE 500 ft / 26 AWG 600 ft / 24 AWG 200 m / TP100
TR-249 Issue 1 Short loop (17 MHz profile)	6.95 dB	300 m / 0.4 mm PE 1000 ft / 26 AWG 1200 ft / 24 AWG 400 m / TP100
WT-249 Issue 2 (Rev 1) Medium loop (30 MHz profile)	10.05 dB	450 m / 0.4 mm PE 1500 ft / 26 AWG 1900 ft / 24 AWG 625 m / TP100
TR-249 Issue 1 Medium loop (17 MHz profile)	13.15 dB	600 m / 0.4 mm PE 2000 ft / 26 AWG 2500 ft / 24 AWG 850 m / TP100
TR-249 Issue 1 Long loop (17 MHz profile)	16.25 dB	750 m / 0.4 mm PE 2500 ft / 26 AWG 3000 ft / 24 AWG 1075 m / TP100

Compliant with all loops defined in Table 17 of the TR-249 Issue 1 to support profile 17A.

In addition, we include the two additional loops added in WT-249 Issue 2 (Rev1) to support testing profile 30A.



Test Loops Attenuation Graph



1.4 Mechanical Loop Interruptions

A Mechanical Loop Interruption is either a total or partial loss of the signal reception capability on the local loop due to external mechanically based actions. There are several categories of mechanical loop interruptions that can have an effect on a vectored group. These include Micro-Interruptions, Single-Wire Interruptions, Micro-Shorts and Disorderly Leave. The VxT-48+ has the capability to test these types of mechanical loop interruptions in a Vectored VDSL2 test environment.

Micro-Interruptions: A Micro-Interruption results from a temporary impedance discontinuity of the local loop at a particular position. The impedance observed at the discontinuity is finite but very large. The VxT-48+ simulates micro-interruptions at the CO end of any test loop, the CPE end of any test loop and/or the 40% point of Long Loop (17MHz Profile) as measured from the CO side of the loop. Micro-interruptions are configured for a one-time opening of the line on Tip or Ring - or Tip and Ring. Furthermore, a more complex, repeatable scheme may be setup by adding optional parameters. In addition, they are configured for one line (up to three lines from a random draw).

Single-Wire Interruption: A Single-Wire Interruption is an actual physical break of only one of the two conductors of the loop at a specific position. There is only a partial loss of the received signal as transmission can continue but in a degraded common mode. The VxT-48+ simulates a single-wire interruption at the CO end of any test loop, the CPE end of any test loop and/or the 40% point of Long Loop (17MHz Profile) as measured from the CO side of the loop. In addition, they are configured for one line (up to three lines from a random draw).



Micro-Shorts: A Micro-Short results from an external mechanical action causing a temporary impedance discontinuity observed at a position on the local loop. The resulting impedance at the discontinuity is positive but quite small. For all practical purposes the discontinuity makes the local loop appear, at this position, electrically, to have a short circuit. The VxT-48+ simulates Micro-Shorts at the CO end of any test loop, the CPE end of any test loop and/or the 40% point of the Long Loop (17MHz Profile) as measured from the CO side of the loop. In addition, they are configured for one line (or a range of up to 48 lines).

Disorderly Leave: A Disorderly Leave occurs when the CPE or CO transceiver is unexpectedly disconnected placing an open circuit in the lateral paths of both the Tip and the Ring causing all communications to cease. The duration of the open circuit is so long that it forces all protocol functions eventually to cease and the communication between the CO and the CPE transceivers appears to become permanently disabled. The VxT-48+ can simulate a disorderly leave at the CO end of any test loop, or the CPE end of any test loop. In addition, they are configured for one line (or a range of lines up to 48 lines) and defined in minutes or hours.

1.5 Main Features

- 48 independent loops
- FEXT emulation between all loops
- Simulates all loops in WT-249 (Rev 23)
- Symmetrical crosstalk matrix
- Mechanical Interruptions
- Efficient automation
- Repeatable testing
- Ideal for parallel testing
- Remote control via Ethernet, RS-232, USB or User-friendly GUI
- Integrates with Model 4901 for complex noise
- Integrates with the VxT-N48 for AWGN and injection of complex noise from 4901



1.6 Specifications

Simulation	<ul style="list-style-type: none"> • TR-249 Issue 1 - All Test Loops • 2 additional test loops added in WT-249 Issue 2 for profile 30A • 48 Independent Test Loops • 2256 Coupling paths
Bandwidth	20 kHz to 30 MHz
Maximum Modem Output Power Allowed	20 dBm
Average Noise Floor	< -143 dBm/Hz
Attenuation (at 1 MHz)	Short loop (30 MHz profile): 3.75 dB Short loop (17 MHz profile): 6.95 dB Medium loop (30 MHz profile): 10.05 dB Medium loop (17 MHz profile): 13.15 dB Long loop (17 MHz profile): 16.25 dB
Crosstalk Accuracy	Meets all the crosstalk accuracy requirements for P20, P50, P80 and P100 as specified in TR-249 Issue 1
Micro-Interruptions (Micro-cut)	<ul style="list-style-type: none"> • Any 3 channels from a random draw. • Micro-cut applied to Tip or Ring - or Tip & Ring simultaneously • Delay to start Micro-cut: 0 s to 65,535 s, in 1-s steps • Micro-cut time: Allowable range 1 ms to 300ms, in 1 ms steps • Period: 0 s to 65,535 s, in 1-s steps • Cycle repetition: 1 to 65,535 in steps of 1, or endless cycle
Single-wire interruption (Cut)	<ul style="list-style-type: none"> • Any 3 channels from a random draw • Cut applied to single wire • Delay to start Cut: 0 s to 65,535 s, in 1-s steps • Cut time: Allowable range 1 s to 65,535 s, in 1-s steps • Period: 0 s to 65,535 s, in 1-s steps • Cycle repetition: 1 to 65,535 in steps of 1, or endless cycle
Micro-Shorts (Short)	<ul style="list-style-type: none"> • Any or all channels • Short applied across Tip and Ring • Delay to start short: 0 s to 65,535 s, in 1-s steps • Short time: Allowable range 1 ms to 300ms, in 1 ms steps • Period: 0 s to 65,535 s, in 1-s steps • Cycle repetition: 1 to 65,535 in steps of 1, or endless cycle



Specifications Continued

Disorderly leave (Disconnect)	<ul style="list-style-type: none">▪ Any or all channels▪ Disconnect applied to Tip and Ring simultaneously▪ Delay to start disconnect: 0 s to 65,535 s, in 1-s steps▪ Disconnect time: Allowable range 1 s to 65,535 s, in 1-s steps▪ Period: 0 s to 65,535 s, in 1-s steps▪ Cycle repetition: 1 to 65,535 in steps of 1, or endless cycle
Remote Control	<ul style="list-style-type: none">• RS-232 / USB / IEEE 802.3 Ethernet (including high-level command set for remote control)
Power Supply	DC power 48 V (100 W maximum) +/- 10%
DC Rating	50 V maximum
xDSL Connection	CAT7 TERA Connectors
Dimensions	355 mm x 465 mm x 278 mm (H x W x D)
Mounting options	Mountable in 19" rack

Specifications are subject to change without notice. Made in USA.



2.0 Before You Begin

2.1 Internal Self-Test At Startup

Upon startup, the unit will execute an internal self-test that takes approximately 30 seconds.

2.2 VxT-48-DC+ is One Integrated Unit

While many of Telebyte's products are designed to be installed in (and removed from) our chassis, the VxT-48-DC+ has no removable components. The VxT-48-DC+ is shipped as a fully assembled, integrated unit that is ready to use.

➤ *Do not attempt to insert or remove any components of the unit as this may cause damage to the product and void the product warranty.*

2.3 Line Pair Labeling

The Emulator utilizes CAT7 TERA connectors that accept four line pairs. The numbering scheme begins with the lowest numbers on the right-hand side and highest on the left. Each connector is associated with a group of four line pairs. See *CAT7 TERA Connectors for Input/Output* later in this document.

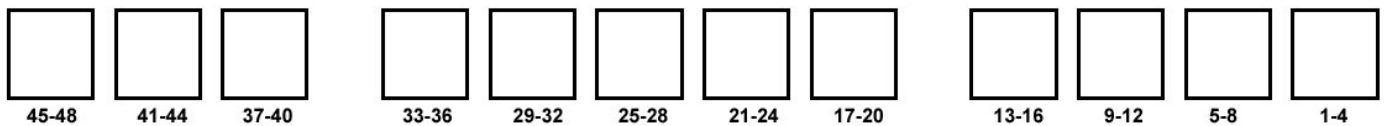


Figure 1: Line Pair Labeling Illustration



3.0 Connectors/Indicators/Switches

3.1 CAT7 TERA Connectors for Input/Output

The top and bottom sections of the Emulator each contain a row of 12 CAT7 TERA connectors, providing connectivity for 48 channels in each section.

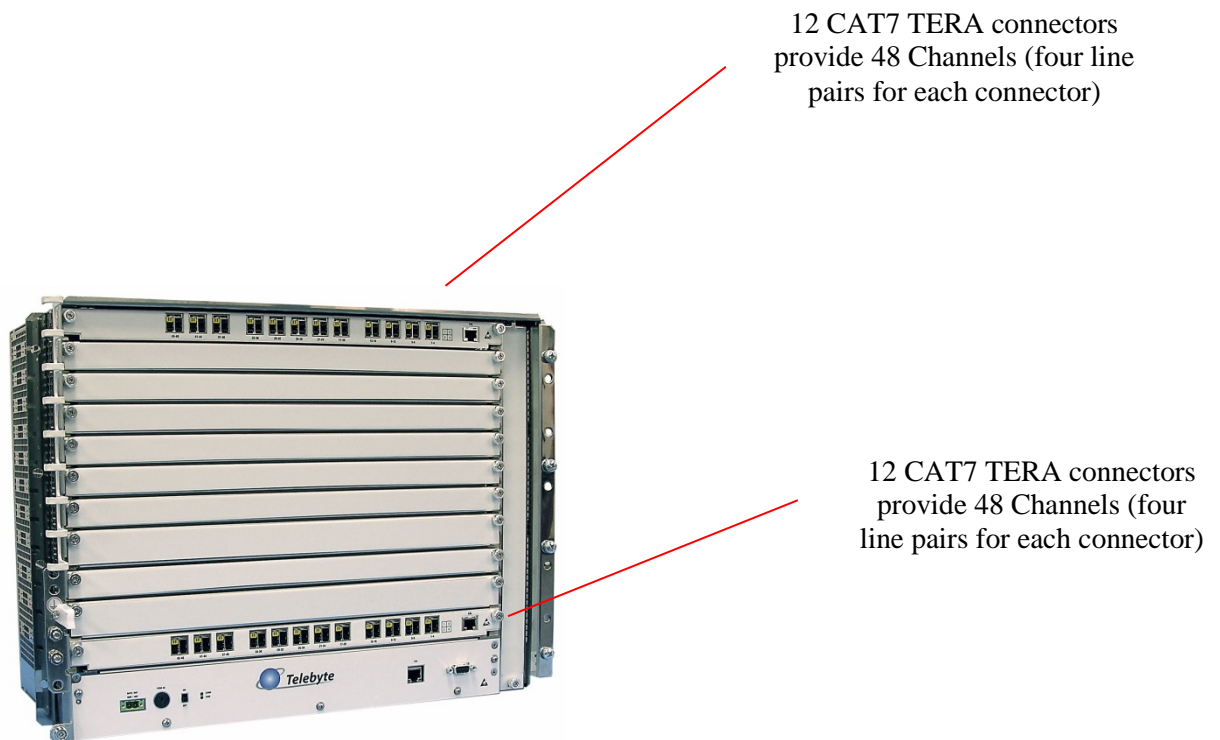


Figure 2: VxT-48-DC+ Input/Output Connectors.

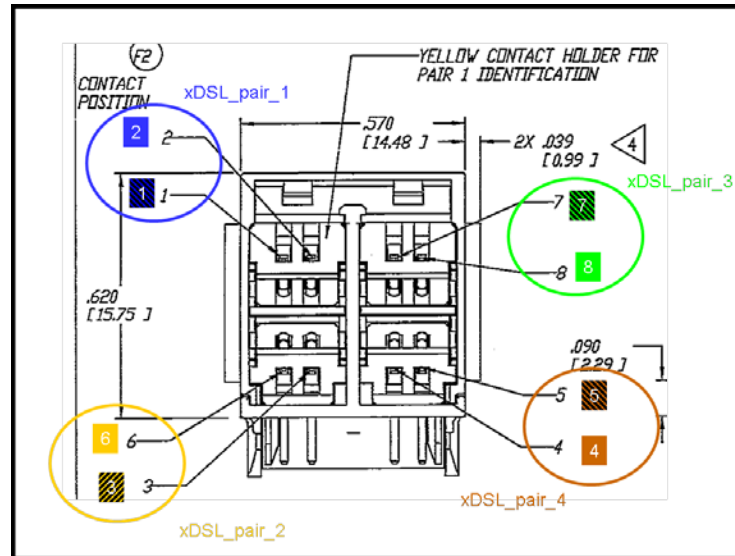


Figure 3: CAT7 TERA Line Pair Diagram Detail

3.2 Remote Control Connectors

- IEEE 802.3 Ethernet: All configuration commands are given through this interface. The Ethernet speed of this link is 10 Mbps. Connecting the Emulator to a switch rather than a hub is recommended as a hub may limit the Ethernet speed of the other equipment connected to the switch.
- RS-232 (DB9 Female)



3.3 Power Switches/Connectors/Fuses

3.3.1 Overview

The Emulator works with AC or DC power. An AC power supply is built into the unit, while DC power is provided by the customer from an external DC input. Once the unit is powered, a separate switch is used to start the Emulator. Please refer to *Figure 2: The VxT-48-DC+ Input/Output Connectors*.

3.3.2 AC Power

When using AC power, plug an AC power cord into the external power supply and turn on the Power Connector On/Off Switch. The input power is 90-240VAC RMS. The DC Power Fuse (4A) is located on the left-hand-side of the front panel.

3.3.3 DC Power

When using DC power, a 48-V DC Power Connector (BAT POWER INPUT) is provided for an external connection from the user's DC input. The DC Input is protected and not damaged when the power input connections are reversed. The DC Power Fuse (4A) is located to the right of the DC Power Connector.

3.4 System Off/On

3.4.1 VxT-48-DC+ System On/Off Switch & ON INDICATOR

After the VxT-48-DC+ is connected to a power source, the VxT-48-DC+ System On/Off Switch is used to start the Emulator. The ON INDICATOR (above the System On/Off switch) lights as soon as the Emulator is turned on. The system is ready to use when the self-test is complete (takes approximately 30 seconds).

3.5 Calibration (CAL)

Used by the factory for calibration purposes.

- To prevent damage, do not insert CAT7 TERA cable into the CAL connector.



4.0 Cables

4.1 Input/Output

Telebyte will provide a quotation for custom CAT7 TERA cables appropriate to the customer's application.

4.2 Cable Management – Best Practices

It is important to reduce mechanical strain on the CAT7 TERA connectors by using cable ties which can be attached to any convenient location on sides of the unit.

- Do not allow the cables to hang down from the CAT7 TERA connectors.

5.0 Rack Mounting VxT-48-DC+

The VxT-48-DC+ may be installed in a 19" rack using the mounting brackets on the left and right sides of the unit.

5.1 Two Rack-Mounting Methods

The enclosure may be flush mounted into a 19" rack or protruding out from the front of a rack by 2.5". For flush mounting, remove (unscrew) the second set of mounting plates (behind the front mounting plates) on each side of the enclosure. For protruding mounting, use the second set of mounting plates that are behind the front plates.

5.2 Grounding

To provide Personnel Safety, earth ground the case by connecting the lower-left screw (with the ground symbol) to earth ground.

- If mounted into a rack, verify that the rack is earth grounded and the enclosure is also grounded to the rack after its mounting screws have been tightened.
- If used outside of a rack connect the lower left screw with the ground symbol to earth ground.



6.0 Basic Operation

6.1 Overview

The VxT-48-DC xTalk Emulator for Vectored VDSL2 Testing provides emulation of crosstalk coupling between all enabled line pairs. Any input and/or output line may be internally terminated with 100 ohms.

6.2 Loops Simulated

The line section emulates the insertion loss of the following loops:

Test Loop	Attenuation at 1 MHz	Examples
WT-249 Issue 2 (Rev 1) Short loop (30 MHz profile)	3.75 dB	150 m / 0.4 mm PE 500 ft / 26 AWG 600 ft / 24 AWG 200 m / TP100
TR-249 Issue 1 Short loop (17 MHz profile)	6.95 dB	300 m / 0.4 mm PE 1000 ft / 26 AWG 1200 ft / 24 AWG 400 m / TP100
WT-249 Issue 2 (Rev 1) Medium loop (30 MHz profile)	10.05 dB	450 m / 0.4 mm PE 1500 ft / 26 AWG 1900 ft / 24 AWG 625 m / TP100
TR-249 Issue 1 Medium loop (17 MHz profile)	13.15 dB	600 m / 0.4 mm PE 2000 ft / 26 AWG 2500 ft / 24 AWG 850 m / TP100
TR-249 Issue 1 Long loop (17 MHz profile)	16.25 dB	750 m / 0.4 mm PE 2500 ft / 26 AWG 3000 ft / 24 AWG 1075 m / TP100

Compliant with all loops defined in Table 17 of the TR-249 Issue 1 to support profile 17A.

In addition, we include the two additional loops added in WT-249 Issue 2 (Rev 1) to support testing profile 30A.



6.3 Test Configuration Options

6.3.1 Enable/Disable Lines

The user can configure a 100-ohm termination on one, some or all of the 48 input or 48 output lines. When terminated, a line is not used.

6.3.2 Line Lengths

There are six line lengths available: 0 and those shown under *Loops Simulated*, earlier in this section.

6.3.3 Mechanical Interruptions

- **Micro-Interruptions:** A Micro-Interruption results from a temporary impedance discontinuity of the local loop at a particular position. The impedance observed at the discontinuity is finite but very large. The VxT-48-DC+ simulates micro-interruptions at the CO end of any test loop, the CPE end of any test loop and/or the 40% point of Long Loop (17MHz Profile) as measured from the CO side of the loop. Micro-interruptions are configured for a one-time opening of the line on Tip or Ring - or Tip and Ring. Furthermore, a more complex, repeatable scheme may be setup by adding optional parameters. In addition, they are configured for one line (up to three lines from a random draw).
- **Single-Wire Interruption:** A Single-Wire Interruption is an actual physical break of only one of the two conductors of the loop at a specific position. There is only a partial loss of the received signal as transmission can continue but in a degraded common mode. The VxT-48-DC+ simulates a single-wire interruption at the CO end of any test loop, the CPE end of any test loop and/or the 40% point of Long Loop (17MHz Profile) as measured from the CO side of the loop. In addition, they are configured for one line (up to three lines from a random draw).
- **Micro-Shorts:** A Micro-Short results from an external mechanical action causing a temporary impedance discontinuity observed at a position on the local loop. The resulting impedance at the discontinuity is positive but quite small. For all practical purposes, the discontinuity makes the local loop appear, at this position, electrically, to have a short circuit. The VxT-48-DC+ simulates Micro-Shorts at the CO end of any test loop, the CPE end of any test loop and/or the 40% point of the Long Loop (17MHz Profile) as measured from the CO side of the loop. In addition, they are configured for one line (or a range of up to 48 lines).
- **Disorderly Leave:** A Disorderly Leave occurs when the CPE or CO transceiver is unexpectedly disconnected, placing an open circuit in the lateral paths of both the Tip and the Ring causing all communications to cease. The duration of the open circuit is so long that it forces all protocol functions eventually to cease and the communication between the CO and the CPE transceivers appears to become permanently disabled. The VxT-48-DC+ can simulate a disorderly leave at at the CO end of any test loop, or the CPE end of any test loop. In addition, they are configured for one line (or a range of lines up to 48 lines) and defined in minutes or hours.



6.3.3.1 Considerations When Defining Micro-Interruptions

- The timing error for line cuts (time open) should always be less than 50 μ s.
- The delay between micro-interruptions is affected by other commands processing. It can also vary if multiple micro-interruptions are configured with different open and close timing values.
- The sum of the different line cut (time open) durations must be less than or equal to 300 ms, although, there is not limitation on the sum of standard cut open times.

6.4 Getting Started

6.4.1 Power and Start Up

Step One: Power VxT-48-DC+

- Follow instructions for either AC or DC power up.

AC Power Instructions

When using AC power, plug an AC power cord into the built-in AC Power Connector and press the AC Power Connector On/Off Switch.

DC Power Instructions

When using DC power, a 48-V DC Power Connector (BAT POWER INPUT) is provided for an external connection from the user's DC input.

- VxT-48-DC+ Power On/Off Switch (POWER)

After the VxT-48-DC+ is connected to a power source, the VxT-48-DC+ System On/Off Switch is used to start the Emulator. The ON LED (above the System On/Off switch) lights as soon as the Emulator is turned on.

Step Two: Wait for Initial Self-Test to Complete

The system is ready to use when the self-test is complete (takes approximately 30 seconds).



6.4.2 Initial Set Up

6.4.2.1 Configure Remote PC IP Address

If a remote PC is used to control the Emulator, an IP address must be assigned to that PC. In addition, the default IP address for the Emulator may be changed (from the remote PC), if desired.

Step One: Configure IP Address of Remote PC

- Set the IP address of the remote PC.

Example Settings (IP address must be within the range of the Emulator's IP address):

IP address: 172.31.233.2

Subnet mask: 255.255.255.0

Default gateway: 172.31.233.1

Step Two: Connect Ethernet Cable

- Using an Ethernet cable, connect the remote PC to the VxT-48-DC.

Step Three: Confirm Connectivity

- From the remote PC, try to "ping" the Emulator in a DOS command window:

> *ping xxx.xxx.x.xx* (where xxx.xxx.x.xx represents the Emulator's IP address)

The default IP address for the VxT-48-DC+ (set at the factory) is 172.16.21.241. See *Optional: Change Default IP Address for VxT-48-DC+*.

6.4.2.2 Confirm Proper Start Up via Telnet

Upon startup, the unit will execute an internal self-test that takes approximately 30 seconds.

Step One: Open Telnet Session

> *telnet xxx.xxx.x.xx* (where xxx.xxx.x.xx represents the Emulator's IP address)

Step Two: Observe Connection Message

> **VxT-48 Ready for commands**
%%



Step Three: Read System Status

The following Telnet commands confirm the Emulator has properly started.

- Issue the command

>show system netif

- The system responds with the MAC, IP, subnet and gateway addresses
- Issue the command

>show system software

- The system responds with the firmware revision and date (e.g., 3.0.3 Mar 3 2012 12:41:03)

Step Four: Close Telnet Session

The Telnet session should be closed at the end of the session, as only one Telnet client at a time is allowed to connect to the VxT-48-DC+.

- Issue the command

>close

6.4.2.3 Optional: Change Default IP Address for VxT-48-DC+ Using Telnet

The VxT-48-DC+ has a factory default IP address (172.16.21.241). This can be changed by the user either with Telnet commands via the Ethernet interface or with Hyperterm (or equivalent) through the Serial port. To use the Telnet option:

Step One: Open Telnet Session

> telnet xxx.xxx.x.xx (where xxx.xxx.x.xx represents the Emulator's current IP address)

Step Two: Enter Configure System Command

>configure system netif <ip_addr> <subnet_mask> <default_gateway>

Example Settings:

<ip_addr>: IP address (e.g. 192.168.1.10)

<subnet_mask>: subnet mask (e.g. 255.255.255.0)

<default_gateway>: default gateway (e.g. 192.168.1.1)

The Telnet session closes automatically after the IP address of the Emulator is changed.



Step Three: Change Remote PC IP Address

If applicable, the user must change the IP address of the remote PC so that it is within the IP range of the Emulator. See *Configure IP Address of Remote PC*.

6.4.2.4 Optional: Change IP Address for VxT-48-DC+ using TES

The VxT-48-DC+ has a factory default IP address (172.16.21.241). This can be changed by the user either with Telnet commands via the Ethernet interface or with terminal emulation software (such as HyperTerminal) through the serial port. To use the TES option:

Step One: Open a TES Session

Step Two: Configure TES

Bits per second: 115200
Data bits: 8
Parity: none
Stop bits: 1
Flow control: none

- Navigate to ASCII properties and check “Echo typed characters locally”

Step Three: Confirm connection

Commands are entered by typing in the desired command and then holding down the Ctrl key while depressing the Enter key. Typing errors cannot be corrected. If an error message is received, reenter the original command using the Ctrl and Enter keys as described above.

- Type, then enter, the following command

show system netif

- The system responds with the MAC, IP, subnet and gateway addresses, followed by

%%

- Optionally, further confirm the connection by typing, then entering, the following command

show system software

- The system responds with the current revision of the firmware and date, followed by

%%



Step Four: Enter Configure System Command

- Type, then enter, the following command

configure system netif <ip_addr> <subnet_mask> <default_gateway>

Example Settings:

<ip_addr>: IP address (e.g. 192.168.1.10)

<subnet_mask>: subnet mask (e.g. 255.255.255.0)

<default_gateway>: default gateway (e.g. 192.168.1.1)

- The system should respond with the following (and no error message)

%%

Step Five: Confirm Change

- Repeat Step Three: Confirm connection. The response should be the new IP address information entered.

Step Six: Change Remote PC IP Address

If applicable, the user must change the IP address of the remote PC so that it is within the IP range of the Emulator. See *Configure IP Address of Remote PC*.



6.5 Considerations When Defining Micro-Interruptions

- The timing error for line cuts (time open) should always be less than 50 μ s.
- The delay between micro-interruptions is affected by other commands processing. It can also vary if multiple micro-interruptions are configured with different open and close timing values.
- The sum of the different line cut (time open) durations must be less than or equal to 300 ms, although, there is not limitation on the sum of standard cut open times.

6.6 Getting Started

6.6.1 Power and Start Up

Step One: Power VxT-48-DC+

- Follow instructions for either AC or DC power up.

AC Power Instructions

When using AC power, plug an AC power cord into the built-in AC Power Connector and press the AC Power Connector On/Off Switch.

DC Power Instructions

When using DC power, a 48-V DC Power Connector (BAT POWER INPUT) is provided for an external connection from the user's DC input.

- VxT-48-DC+ Power On/Off Switch (POWER)

After the VxT-48-DC+ is connected to a power source, the VxT-48-DC+ System On/Off Switch is used to start the Emulator. The ON LED (above the System On/Off switch) lights as soon as the Emulator is turned on.

Step Two: Wait for Initial Self-Test to Complete

The system is ready to use when the self-test is complete (takes approximately 30 seconds).



6.6.2 Initial Set Up

6.6.2.1 Configure Remote PC IP Address

If a remote PC is used to control the Emulator, an IP address must be assigned to that PC. In addition, the default IP address for the Emulator may be changed (from the remote PC), if desired.

Step One: Configure IP Address of Remote PC

- Set the IP address of the remote PC.

Example Settings (IP address must be within the range of the Emulator's IP address):

IP address: 172.31.233.2

Subnet mask: 255.255.255.0

Default gateway: 172.31.233.1

Step Two: Connect Ethernet Cable

- Using an Ethernet cable, connect the remote PC to the VxT-48-DC.

Step Three: Confirm Connectivity

- From the remote PC, try to "ping" the Emulator in a DOS command window:

> *ping xxx.xxx.x.xx* (where *xxx.xxx.x.xx* represents the Emulator's IP address)

The default IP address for the VxT-48-DC+ (set at the factory) is 172.16.21.241. See *Optional: Change Default IP Address for VxT-48-DC+*.

6.6.2.2 Confirm Proper Start Up via Telnet

Upon startup, the unit will execute an internal self-test that takes approximately 30 seconds.

Step One: Open Telnet Session

> *telnet xxx.xxx.x.xx* (where *xxx.xxx.x.xx* represents the Emulator's IP address)

Step Two: Observe Connection Message

> **VxT-48 Ready for commands**

%%



Step Three: Read System Status

The following Telnet commands confirm the Emulator has properly started.

- Issue the command

>show system netif

- The system responds with the MAC, IP, subnet and gateway addresses
- Issue the command

>show system software

- The system responds with the firmware revision and date (e.g., 4.0.0 Mar 17, 2014)

Step Four: Close Telnet Session

The Telnet session should be closed at the end of the session, as only one Telnet client at a time is allowed to connect to the VxT-48-DC+.

- Issue the command

>close

6.6.2.3 Optional: Change Default IP Address for VxT-48-DC+ Using Telnet

The VxT-48-DC+ has a factory default IP address (172.16.21.241). This can be changed by the user either with Telnet commands via the Ethernet interface or with Hyperterm (or equivalent) through the Serial port. To use the Telnet option:

Step One: Open Telnet Session

> telnet xxx.xxx.x.xx (where xxx.xxx.x.xx represents the Emulator's current IP address)

Step Two: Enter Configure System Command

>configure system netif <ip_addr> <subnet_mask> <default_gateway>

Example Settings:

<ip_addr>: IP address (e.g. 192.168.1.10)

<subnet_mask>: subnet mask (e.g. 255.255.255.0)

<default_gateway>: default gateway (e.g. 192.168.1.1)

The Telnet session closes automatically after the IP address of the Emulator is changed.



Step Three: Change Remote PC IP Address

If applicable, the user must change the IP address of the remote PC so that it is within the IP range of the Emulator. See *Configure IP Address of Remote PC*.

6.6.2.4 Optional: Change IP Address for VxT-48-DC+ using TES

The VxT-48-DC+ has a factory default IP address (172.16.21.241). This can be changed by the user either with Telnet commands via the Ethernet interface or with terminal emulation software (such as HyperTerminal) through the serial port. To use the TES option:

Step One: Open a TES Session

Step Two: Configure TES

Bits per second: 115200
Data bits: 8
Parity: none
Stop bits: 1
Flow control: none

- Navigate to ASCII properties and check “Echo typed characters locally”

Step Three: Confirm connection

Commands are entered by typing in the desired command and then holding down the Ctrl key while depressing the Enter key. Typing errors cannot be corrected. If an error message is received, reenter the original command using the Ctrl and Enter keys as described above.

- Type, then enter, the following command

show system netif

- The system responds with the MAC, IP, subnet and gateway addresses, followed by

%%

- Optionally, further confirm the connection by typing, then entering, the following command

show system software

- The system responds with the current revision of the firmware and date, followed by

%%



Step Four: Enter Configure System Command

- Type, then enter, the following command

configure system netif <ip_addr> <subnet_mask> <default_gateway>

Example Settings:

<ip_addr>: IP address (e.g. 192.168.1.10)

<subnet_mask>: subnet mask (e.g. 255.255.255.0)

<default_gateway>: default gateway (e.g. 192.168.1.1)

- The system should respond with the following (and no error message)

%%

Step Five: Confirm Change

- Repeat Step Three: Confirm connection. The response should be the new IP address information entered.

Step Six: Change Remote PC IP Address

If applicable, the user must change the IP address of the remote PC so that it is within the IP range of the Emulator. See *Configure IP Address of Remote PC*.



7.0 Remote Control

The VxT-48-DC+ can be controlled either by the Ethernet or Serial (RS232) interface. All commands (except the initial Ethernet message) and their responses are very similar, regardless of which interface is used. Typically, Telnet is used for the Ethernet interface and Hyperterm (or equivalent) is used for the Serial interface.

7.1 Telnet Command List

- Only one Telnet client at a time is allowed to connect to the VxT-48-DC+.

Open Telnet Session

> **telnet xxx.xxx.x.xx** (where xxx.xxx.x.xx represents the IP address of the Emulator)

Close Telnet session

>**close**

7.2 Remote Control Command List

- In this section, the words “line” and “channel” are interchangeable, except for those instances where the user is explicitly directed to use the word “line” in commands.

7.2.1 About Command Responses

Command responses begin with an asterisk (*) and differ according to the command and notification level. There may be additional responses if errors occur during command processing (e.g., ***ERROR command failed <command type>**). The last response will be **%%** signifying that a new command may be issued.

See *Appendix A – Command Summary* for a chart of commands.



7.2.2 Configure Network Interface

- Sets the IP address, subnet mask, and gateway for the Ethernet connection. (If issued via Ethernet, the connection is lost and must be re-established using the new IP address.)

Configure Network Interface Syntax

configure system netif <ip adr> <sub-net> <gateway>

where:

<**ip adr**> is the Internet protocol address given in “dot notation” without spaces (e.g., 192.168.1.10)

<**sub-net**> is the Sub-network given in “dot notation” without spaces (e.g., 255.255.255.0)

<**gateway**> is the Internet gateway given in “dot notation” without spaces (e.g., 192.168.1.1)

Normal Ethernet Response without Errors

There is no Ethernet response. The VxT-48-DC+ disconnects and the Telenet session must be re-established with the new IP address.

Normal Serial Response without Errors

%%



7.2.3 Show System Netif

- Shows the MAC, IP address, subnet and gateway information.

Show System Netif Syntax

show system netif

Normal Response without Errors

```
mac <mac address>  
ip <ip_adr>  
subnet <subnet>  
gateway <gateway>  
%%
```

Show System Netif Example:

```
mac 00-0a-35-00-01-03  
ip 172.31.233.236  
subnet 255.255.255.0  
gateway 172.31.233.1  
%%
```

Response with Errors

Does not apply.



7.2.4 Show System Software

- Shows the firmware revision information.

Show System Software Syntax

show system software

Normal Response without Errors

<rev no> <date>

Where

<rev_no> is the revision of the firmware

<date> is the date when the firmware was built

Show System Example:

4.0.0 Mar 17, 2014

Response with Errors

Does not apply.



7.2.5 Set Length

- Sets the total length of a line or a range of lines

Set Length Syntax

set length <line> <length>

Where:

<line> is a line number or range of line numbers. A range is specified by providing the first and last line numbers in the range, divided by a colon (e.g., range 20 to 25 is entered as 20:25). Allowable values: Any number in the range from 1-48

<length> is the length of the specified line(s). Allowable values: 0, 500, 1000, 1500, 2000, 2500

Normal Response without Errors

%%

Response with Errors

Error	Response
Line not in the range 1-48	*Error Bad line number. Line range is 1-48 for this command *Error command failed (set) %%
Length wrong	*Error Length not equal to 0, 500, 1000, 1500, 2000, 2500 *Error command failed (set) %%

Set Length Examples

1. Set line 43 to 2,000 feet

Command: **set length 43 2000**

2. Set lines 20, 21, and 22 to 0 feet

Command: **set length 20:22 0**



7.2.6 Show Length

- Reports the length state of a line or range of lines.

Show Length Syntax

show length <line>

Show Length Response without Errors

**line <line> length <length>
%%**

Show Length Examples

1. Show the length of line 43

Command: **show length 43**

Response: line 43 length 2000
 %%

2. Show the length of lines 20 through 22

Command: **show length 20:22**

Response: line 20 length 0
 line 21 length 0
 line 22 length 0
 %%

Response with Errors

Does not apply.



7.2.7 Set Term

- Sets the termination status of a line or range of lines to Yes or No.

When the termination is set to Yes on a line, it is disconnected from the VxT-48-DC+ at both the input and output. No signals pass to/from the CAT7TERA connector to the Emulator in either direction on the line. Instead, both the input and output pins for the line are terminated with 100 ohms to ground and a second pair of 100 ohm resistors is connected to the VxT-48-DC+'s internal circuitry in place of the line.

Set Term Syntax

set term <line> (yes | no)

Where:

<line> is a line number or range of line numbers. A range is specified by providing the first and last line numbers in the range, divided by a colon (e.g., range 20 to 25 is entered as 20:25). Allowable values: Any number in the range from 1-48

(yes | no): Issuing this command with *yes* as the final word, causes this line to be terminated with 100 ohms at both the input and output. Signals will not be transmitted in either direction on this line. Issuing this command with *no* as the final word causes the input and out terminals to be connected together through the VxT-48-DC+.

Normal Response without Errors

%%

Response with Errors

Error	Response
Line not in the range 1-48	*Error Bad line number. Line range is 1-48 for this command *Error command failed (set) %%
Termination specification incorrect	*Error Termination specifier incorrect not 'yes' or 'no' *Error command failed (set) %% or Error Error getting required termination *Error command failed (set) %%



Set Term Example

1. Set the termination of line 43 to yes

Command: **set term 43 yes**

7.2.8 Show Term

- Shows the termination status of a line.

Show Term Syntax

show term <line>

Normal Response without Errors

line <line> term (yes | no | partial)

Where:

Returns “yes” if all four terminating resistors are connected.
Returns “no” if no terminating resistors are connected.
Returns “partial” for any other configuration of resistors.

Show Term Example:

1. Show the termination of the first 3 lines

Command: **show term 1:3**

Response: line 1 term yes
 line 2 term no
 line 3 term no
 %%

Response with Errors

Does not apply.



7.2.9 Configuring Mechanical Interruptions

7.2.9.1 Types of Mechanical Interruptions (Cuts)

When working with remote commands, there are five types of cuts (mechanical interruptions), defined in the 2nd word of the command string:

Type	Referred to in commands as
Micro-Interruption (line open value in seconds)	cut
Micro-Interruption (line open value in milliseconds)	microcut
Single-Wire Interruption	swcut
Disorderly Leave	leave
Micro-Short	microshort

7.2.9.2 Using Sync

Any cut type is configured and then either executed immediately or saved in memory (referred to in this text as pending) to be executed with all other pending cuts at a later time, using the Sync Start command.

The sync parameter is specified in the 10th word of any cut command and is set to Yes or No.

Sync No: Configures the cut as non-pending cut (for the specified line or range of lines). Executed as soon as the Enter key is pressed. This is the default value.

Sync Yes: Configures the cut as pending (for the specified line or range of lines). All pending cuts are executed when the Sync Start command is entered.

Sync Start: Starts all pending cuts simultaneously.

Sync Clear: Removes all pending cuts from memory.

Show Sync: Displays all pending cuts and their parameters.

- Upon completion of any mechanical interruption routine, all cut values are reset to the default state.

7.2.9.3 Conductor Type

The conductor type must be specified when defining a cut, using one of the following values in the 3rd word of the command string:

Type	Referred to in commands as
Tip	t
Ring	r
Both Tip and Ring	b
Single Wire	sw
Short	s



7.2.9.4 Location

The location of the cut on the line must be specified when defining a cut, using one of the following values for the 4th word of the command string:

Type	Referred to in commands as
CO side of line	co
Mid point of line	mid
CPE side of line	cpe



7.2.10 Set Cut

Set Cut Syntax

1st word	2nd word	3rd word	4th word	5th word
		Channel	Conductor	Location
set	cut	<line> <line range>	<type> = t r b	<location> = co mid cpe

6th word	7th word	8th word	9th word	10th word
Delay	Open Time	Period (seconds)	Repetition Cycles	Sync
[<delay time>]	<open time seconds> inf	<period>	<count> inf	yes no

<> = value | = OR

Where:

<line> | <line range> is a line number or range of line numbers. A range is specified by providing the first and last line numbers in the range, divided by a colon (e.g., range 20 to 25 is entered as 20:25). Allowable values: Any number in the range from 1-48

<type> is the type of conductor specified. Allowable values: t = tip, r = ring, b = both tip and ring. Refer to “Conductor Type” earlier in this document.

<location> is the location of the cut on the line. Allowable values: co = co side, mid = midpoint, cpe = cpe side. Refer to “Location” earlier in this document.

<delay> Is the time (in seconds) between when the Enter key is pressed (for non-pending cuts) or when the sync start command is issued (for pending cuts) - and when the first cut begins.

Allowable Range: 0 s to 65,535 s

Increments: 1 s

<open time seconds> is the length of time for which the line is cut in seconds. Optional **inf** value generates a cut of 65,535 seconds.

Allowable Range: 1 s to 65,535 s or inf

Increments: 1 s

<period> is the time of the complete cycle. The cycle consists of the interrupt time (cut or short) and the closed time. Periods are only in seconds.

Allowable Range: 0 s to 65,535 s

Increments: 1 s



<count> This parameter must be present either as a number or *inf* if the *close_time* is non_zero. It represents the number of line cut events to execute. Either the “count” or “inf” value is specified.

Allowable Range: 1 to 65,535 counts

Increments: 1 count

May also enter *inf* to produce an infinite number of line cut events.

Sync**<yes | no>** = is used to either include (yes) or not include (no) the configuration for the line (or range of lines) in the pending cuts queue. Refer to “Using Sync” earlier in this document.

Normal response without Errors

%%

Response with Errors

*Error command failed (<command type >)

%%

Set Cut Example

Configure a 3-second open, followed by a 5-second close, on the tip conductor, CO side, on lines 1-24, repeating 5 times. Add this configuration to the pending queue. The sequence will execute when the *sync start* command is issued, with no delay.

Set cut 1:24 t co 0 3 5 5 yes



7.2.11 Set Microcut

Set Microcut Syntax

1st word	2nd word	3rd word	4th word	5th word
		Channel	Conductor	Location
set	microcut	<line> <line range>	<type> = t r b	<location> = co mid cpe

6th word	7th word	8th word	9th word	10th word
Delay	Open Time	Period (seconds)	Repetition Cycles	Sync
[<delay time>]	<open time milliseconds>	<period>	<count> inf	\yes no

<> = enter value | = OR

Where:

<line> | <line range> is a line number or range of line numbers. A range is specified by providing the first and last line numbers in the range, divided by a colon (e.g., range 20 to 25 is entered as 20:25). Allowable values: Any number in the range from 1-48

<type> is the type of conductor specified. Allowable values: t = tip, r = ring, b = both tip and ring. Refer to “Conductor Type” earlier in this document.

<location> is the location of the cut on the line. Allowable values: co = co side, mid = midpoint, cpe = cpe side. Refer to “Location” earlier in this document.

<delay> Is the time (in seconds) between when the Enter key is pressed (for non-pending cuts) or when the sync start command is issued (for pending cuts) - and when the first cut begins.

Allowable Range: 0 s to 65,535 s

Increments: 1 s

Allowable Range: 0 s to 65,535 s

<open time milliseconds> is the length of time for which the line is cut in milliseconds.

Allowable Range: 2.5 ms to 300 ms

Increments: 0.1 ms

<period> is the time of the complete cycle. The cycle consists of the interrupt time (cut or short) and the closed time. Periods are only in seconds.

Allowable Range: 0 s to 65,535 s

Increments: 1 s

<count> This parameter must be present either as a number or *inf* if the *close_time* is non_zero. It represents the number of line cut events to execute. Either the “count” or “inf” value is specified.



Allowable Range: 1 to 65,535 counts

Increments: 1 count

May also enter *inf* to produce an infinite number of line cut events.

Sync<**yes** | **no**> = is used to either include (yes) or not include (no) the configuration for the line (or range of lines) in the pending cuts queue. Refer to “Using Sync” earlier in this document.

Normal response without Errors

%%

Response with Errors

*Error command failed (<command type >)

%%

Set Microcut Example

Configure a 10-millisecond open, followed by a 5-second close, on the tip conductor, CO side, on lines 1-24, repeating 5 times. Add this configuration to the pending queue. The sequence will execute when the *sync start* command is issued, with no delay.

set microcut 1:24 t co 0 10 5 5 yes

Example for standard testing TR-249 Issue 1 (Type 1 interrupt on both tip and ring at CO and CPE with 9-ms opening every 10s, for 12 repetitions).

set microcut 9 b co 0 9 10 12 yes

set microcut 9 b cpe 5 9 10 12 yes

sync start



7.2.12 Set Swcut (Single-Wire Cut)

Set swcut Syntax

1st word	2nd word	3rd word	4th word	5th word
		Channel	Conductor	Location
set	swcut	<line> <line range>	<type> = sw	<location> = co mid cpe

6th word	7th word	8th word	9th word	10th word
Delay	Open Time	Period (seconds)	Repetition Cycles	Sync
<delay time>	<open time seconds> inf	<period>	<count> inf	yes no

<> = value | = OR

Where:

<line> | <line range> is a line number or range of line numbers. A range is specified by providing the first and last line numbers in the range, divided by a colon (e.g., range 20 to 25 is entered as 20:25). Allowable values: Any number in the range from 1-48

<type> is the type of conductor specified. Allowable values: sw. Refer to “Conductor Type” earlier in this document.

<location> is the location of the cut on the line. Allowable values: co = co side, mid = midpoint, cpe = cpe side. Refer to “Location” earlier in this document.

<delay> Is the time (in seconds) between when the Enter key is pressed (for non-pending cuts) or when the sync start command is issued (for pending cuts) - and when the first cut begins.

Allowable Range: 0 s to 65,535 s

Increments: 1 s

Allowable Range: 0 s to 65,535 s

<open time seconds> is the length of time for which the line is cut in seconds. Optional **inf** value generates a cut of 65,535 seconds.

Allowable Range: 1 s to 65,535 s or inf

Increments: 1 s

<period> is the time of the complete cycle. The cycle consists of the interrupt time (cut or short) and the closed time. Periods are only in seconds.

Allowable Range: 0 s to 65,535 s

Increments: 1 s



<count> This parameter must be present either as a number or *inf*. It represents the number of line cut events to execute. Either the “count” or “inf” value is specified.

Allowable Range: 1 to 65,535 counts

Increments: 1 count

Default = 1

May also enter *inf* to produce an infinite number of line cut events.

Sync<**yes** | **no**> = is used to either include (yes) or not include (no) the configuration for the line (or range of lines) in the pending cuts queue. Refer to “Using Sync” earlier in this document.

Normal response without Errors

%%

Response with Errors

*Error command failed (<command type >)

%%

Set Swcut Example

Configure a 10-second open, followed by a 5-second close, on a single wire, CO side, on lines 1-24, repeating 5 times. Add this configuration to the pending queue. The sequence will execute when the *sync start* command is issued, with no delay.

Set swcut 1:24 sw co 0 10 5 5 yes



7.2.13 Set Leave (Disorderly Leave)

Set leave Syntax

1st word	2 nd word	3 rd word	4 th word	5 th word
		Channel	Conductor	Location
set	leave	<line> <line range>	<type> = b	<location> = cpe

6 th word	7 th word	8 th word	9 th word	10 th word
Delay	Open Time	Period (seconds)	Repetition Cycles	Sync
<delay time>	<open time seconds> inf	<period>	<count> inf	yes no

< > = value | = OR

Where:

<line> | <line range> is a line number or range of line numbers. A range is specified by providing the first and last line numbers in the range, divided by a colon (e.g., range 20 to 25 is entered as 20:25). Allowable values: Any number in the range from 1-48

<type> is the type of conductor specified. Allowable values: t = tip, r = ring, b = both tip and ring. Refer to “Conductor Type” earlier in this document.

<location> is the location of the cut on the line. Allowable values: co = co side, mid = midpoint, cpe = cpe side. Refer to “Location” earlier in this document.

<delay> Is the time (in seconds) between when the Enter key is pressed (for non-pending cuts) or when the sync start command is issued (for pending cuts) - and when the first cut begins.

Allowable Range: 0 s to 65,535 s

Increments: 1 s

<open time seconds> is the length of time for which the line is cut in seconds. Optional **inf** value generates a cut of 65,535 seconds.

Allowable Range: 1 s to 65,535 s or inf

Increments: 1 s

<period> is the time of the complete cycle. The cycle consists of the interrupt time (cut or short) and the closed time. Periods are only in seconds.

Allowable Range: 0 s to 65,535 s

Increments: 1 s



<count> This parameter must be present either as a number or *inf* if the *close_time* is non_zero. It represents the number of line cut events to execute. Either the “count” or “inf” value is specified.

Allowable Range: 1 to 65,535 counts

Increments: 1 count

May also enter *inf* to produce an infinite number of line cut events.

Sync**<yes | no>** = is used to either include (yes) or not include (no) the configuration for the line (or range of lines) in the pending cuts queue. Refer to “Using Sync” earlier in this document.

Normal response without Errors

%%

Response with Errors

*Error command failed (<command type >)

%%

Set Leave Example

Configure a 10-second open, followed by a 5-second close, on both tip and ring, CPE side, on lines 1-24, repeating 5 times. Add this configuration to the pending queue. The sequence will execute when the *sync start* command is issued, with no delay.

set leave 1:24 b co 0 10 5 5 yes



7.2.14 Set microshort

Set microshort Syntax

1st word	2 nd word	3 rd word	4 th word	5 th word
		Channel	Conductor	Location
set	microshort	<line> <line range>	<type> = s	<location> = co mid cpe

6 th word	7 th word	8 th word	9 th word	10 th word
Delay	Open Time	Period (seconds)	Repetition Cycles	Sync
<delay time>	<open time milliseconds>	<period>	<count> inf	yes no

<> = value | = OR

Where:

<line> | <line range> is a line number or range of line numbers. A range is specified by providing the first and last line numbers in the range, divided by a colon (e.g., range 20 to 25 is entered as 20:25). Allowable values: Any number in the range from 1-48

<type> is the type of conductor specified. Allowable values: t = tip, r = ring, b = both tip and ring. Refer to “Conductor Type” earlier in this document.

<location> is the location of the cut on the line. Allowable values: co = co side, mid = midpoint, cpe = cpe side. Refer to “Location” earlier in this document.

<delay> Is the time (in seconds) between when the Enter key is pressed (for non-pending cuts) or when the sync start command is issued (for pending cuts) - and when the first cut begins.

Allowable Range: 0 s to 65,535 s

Increments: 1 s

Allowable Range: 0 s to 65,535 s

<open time milliseconds> is the length of time for which the line is cut in milliseconds.

Allowable Range: 2.5 ms to 300 ms

Increments: 0.1 ms

<period> is the time of the complete cycle. The cycle consists of the interrupt time (cut or short) and the closed time. Periods are only in seconds.

Allowable Range: 0 s to 65,535 s

Increments: 1 s

<count> This parameter must be present either as a number or *inf* if the *close_time* is non_zero. It represents the number of line cut events to execute. Either the “count” or “inf” value is specified.



Allowable Range: 1 to 65,535 counts

Increments: 1 count

May also enter *inf* to produce an infinite number of line cut events.

Sync<**yes** | **no**> = is used to either include (yes) or not include (no) the configuration for the line (or range of lines) in the pending cuts queue. Refer to “Using Sync” earlier in this document.

Normal response without Errors

%%

Response with Errors

*Error command failed (<command type >)

%%

Set Microshort Example

Configure a series of shorts with a 10-millisecond open, followed by a 5-second close, CPE side, on lines 1-24, repeating 5 times. Add this configuration to the pending queue. The sequence will execute when the *sync start* command is issued, with no delay.

set microshort 1:24 s co 0 10 5 5 yes



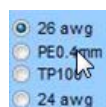
8.0 VxT-48-DC+ Control Center Software

The VxT-48-DC+ Control Center Software allows the user to toggle between the Term/Length View and Interruption View. All channels are shown on the screen at one time.

8.1 Global Controls



Set Comm Parameters: Click button to view/edit the communication parameters.



Select Wire Type: click the radio button that corresponds to the desired wire type. For more information, refer to "Test Loops" in the Introduction to this manual.



Configuration File: load an existing configuration or save the current one by clicking the appropriate button.



Copy Settings: copy termination/length settings, interruption settings, or both types, from a source channel to a range of channels.

Term/Length (Term/len): check the boxes related with the desired setting types.

Source Channel (Ch): select the channel from which the settings will be copied.

Copy Start: select the channel at the beginning of the range using the dropdown.

Copy (Step): indicate how to increment channel selection within the range by selecting a value from the dropdown. The increment begins at next the channel number after the Copy Start value and counts up by the Step value. The selection will not exceed the End range.

Example: in a range of channel 2 through 10, with a step value of 5, only channels 2 and 7 are affected.

Copy(End): select the channel at the end of the range using the dropdown.

Copy: click to copy the settings to all channels in the configured range.

Interruption Controls:

- See Configuring Mechanical Interruptions earlier in this manual.

Reset Interrupts (int'rpts): reset all interruption settings to their default values. Does not stop currently running interruptions.

Stop Interrupts (int'rpts): stop all interruptions currently running and clear the queue.

Send Commands (Cmds): send all interruption settings to the Sync queue. Only the settings on channels where “INT ON” is checked are sent.

Send Commands (Cmds) Start: start all interruptions in the Sync queue and/or start interruptions marked with “INT ON.”

(Show que'd) Sync Queue: displays a list of interruptions in the Sync queue.



8.2 Screen Views

8.2.1 Interruption View

Type: select the micro-interruption type for the related channel. Types available:

Micro-Interruption (line open value in seconds)	cut
Micro-Interruption (line open value in milliseconds)	microcut
Single-Wire Interruption	swcut
Disorderly Leave	leave
Micro-Short	microshort

Wire: select the wire on which the interruption will occur (ring, tip, tip & ring). Only valid combinations of Type and Wire are allowed.

Location (LOC): interruptions are configured for the CO or CPE side of the loop or the midpoint.



Delay: the time (in seconds) between when Send Command Start button is clicked and when the first interruption begins.

On Time: the amount of time for which the line is interrupted.

Period: the time of the complete cycle. The cycle consists of the interrupt time (cut or short) and the closed time. Periods are only in seconds.

Repeat: represents the number of interruption events to execute. Enter the number of events in the Count field or select Infinite (for an infinite number of interruption events).

Interrupt On (INT ON): check the INT ON box to include the interruption configuration for the relate channel in the channels added to the Sync queue.



8.2.2 Term/Length View

The screenshot shows the 'VxT Control Center' software interface. At the top, there's a header with the Telebyte logo and the title 'VxT Control Center'. Below the header, there are several control panels. On the left, 'Set Comm Parameters' includes options for 26 awg, PE0.4mm, TP100, and 24 awg. Next to it is the 'Configuration File' panel with 'Load' and 'Save As' buttons. To the right of these is the 'Term/len interruption' panel, which has checkboxes for 'Term/len' and 'interruption', a 'Source Ch.' dropdown set to 1, and 'Copy Start' and 'End' dropdowns set to 2 and 48 respectively. Further right is a 'Term/Length View' panel with a radio button selected for 'Term/Length View' and another for 'Interruption View'. On the far right, there's a 'Ready' status indicator. The main area of the interface is divided into three columns, each representing a set of channels (1-16, 17-32, and 33-48). Each channel has a 'Term' dropdown menu and a 'Length' dropdown menu. A green box next to each channel indicates the 'Active Indicator'.

Termination: check the box associated with the related channel to terminate the line. When the termination is set to Yes on a line, it is disconnected from the VxT-48-DC+ at both the input and output. No signals pass to/from the CAT7TERA connector to the Emulator in either direction on the line. Instead, both the input and output pins for the line are terminated with 100 ohms to ground and a second pair of 100 ohm resistors is connected to the VxT-48-DC+'s internal circuitry in place of the line.

Length: select the loop length for the related channel.



Active Indicator: the box to the right of the channel will turn green while an interruption sequence on that channel is actively running and revert to a blue color when the interruption sequence has ended.



8.2.1 Queued Interrupts

	Line	CO	MID	CPE
1	1	cut 1 t co 0 1 2 1 yes		
2	2			microcut 2 t cpe 0 5 10 12 yes
3	3		swcut 3 sw mid 3 2 3 inf yes	
4	4			leave 4 b cpe 0 1 2 1 yes
5	5			
6	6			
7	7			
8	8			
9	9			
10	10			
11	11			
12	12			
13	13			
14	14			
15	15			
16	16			
17	17			
18	18			
19	19			
20	20			
21	21			
22	22			
23	23			
24	24			
25	25			
26	26			
27	27			
28	28			
29	29			
30	30			
31	31			
32	32			
33	33			
34	34			
35	35			
36	36			

9.0 Technical Support

Technical support is available on the web by going to <http://www.telebytebroadband.com/support.html>.



Appendix A – Command Summary

Commands

Set

1st word	2nd word	3rd word	4th word	5th word	6th word	7th word	8th word	9th word	10th word
		Channel	Conductor	Location	Initial Delay to Start (seconds)	Open Time	Period (seconds)	Repetition Cycles	Sync
set	microcut	<line> <line range>	<type> = t r b	<location> = co mid cpe	<delay time>	<open time milliseconds>	<period>	<count> inf	yes no
set	swcut	<line> <line range>	<type> = sw	<location> = co mid cpe	<delay time>	<open time seconds> inf	<period>	<count> inf	yes no
set	leave	<line> <line range>	<type> = b	<location> = cpe	<delay time>	<open time seconds> inf	<period>	<count> inf	yes no
set	microshort	<line> <line range>	<type> = s	<location> = co mid cpe	<delay time>	<open time milliseconds>	<period>	<count> inf	yes no
set	cut	<line> <line range>	<type> = t r b	<location> = co mid cpe	<delay time>	<open time seconds> inf	<period>	<count> inf	yes no
set	length	<line>	<length>						
set	term	<yes no >							

Microcut = Micro-Interruption | swcut = Single Wire-Interruption | leave = Disorderly Leave (Shutdown) | microshort = Micro-Short | cut = Cut | inf=infinite
t = tip | r = ring | b = both | s = short | sw = single wire | line range = 1-48 allowed |

Sync

1st word	2nd word	Additional Information
sync	start	When Sync set to "yes" at the 10 th word, executes the start of all lines simultaneously at all locations. When Sync set to "no" at the 10th word, the interrupt is started at the line return.
sync	clear	Removes all pending sync commands from memory and sets 0 open time and 0 Period for each location.