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A **BELDEN** BRAND

TLX

Matrix Switch
ASCII API V5

A Full Description of the Command Set Used to Control
Thinklogical's® TLX Series of KVM Matrix Switches

TLX12
TLX24
TLX48
TLX48 2RU
TLX80
TLX160
TLX320
TLX640
TLX1280

Rev. M, July 2023

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Subject: TLX Matrix Switch ASCII API V5
Revision: M, July 2023

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PREFACE

About Thinklogical A BELDEN BRAND

thinklogical, A BELDEN BRAND
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Thinklogical, a Belden Brand, is the leading manufacturer and provider of fiber-optic and CATx video, KVM, audio, and peripheral extension and switching solutions used in video-rich, big-data computing environments.

Thinklogical offers the only fiber-optic KVM Matrix Switches in the world that are accredited to the Common Criteria EAL4, TEMPEST SDIP 24 Level B, and NATO NIAPC Evaluation Scheme: GREEN and the U.S. DoD DISA JITC UCR 2013 APL information assurance standards. And Thinklogical Velocity products are the first system with both KVM and video matrix switching capabilities to be placed on the Unified Capabilities Approved Product List (UC APL) under the Video Distribution System (VDS) category.

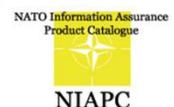**Thinklogical products are designed and manufactured in the USA and are certified to the ISO 9001:2015 standard.**

Thinklogical is headquartered in Milford, Connecticut and is owned by Belden, Inc., St. Louis, MO (http://www.belden.com). For more information about Thinklogical products and services, please visit https://www.thinklogical.com.

About This Manual

This document describes the command set used to control Thinklogical's TLX series of Matrix Switches. The TLX Matrix Switch API commands are based on the command set used by our VX Matrix Switches and are detailed in the document: Matrix_Switch_ASCII_API.

- 5.00-A Initial release (created from the VX Matrix Switch version of this manual: V4.5-1 Rev E)

Active Links

This document contains active cross-reference links in the *Table of Contents* and for referenced pages throughout, shown in this format: [18], and for external hyperlinks, shown in this format: link.format.

- For **.pdf**: *point/left click* ⟶ pg. [18]
  Left-click

- For **.doc**: *Ctrl/point/left click* ⟶ Ctrl + pg. [18]
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- To **return to the front of the document**: *Ctrl/Home.* ⟶ Ctrl + home

Note and Warning Symbols

Throughout this manual you will notice certain symbols that bring your attention to essential information. These are **Notes** and **Warnings**. *Please read this information thoroughly*. Examples are shown below.

⚠ **Note: A note is meant to call the reader's attention to helpful or valuable information at a point in the text that is relevant to the subject under discussion.**

🛑 **Warning! A warning is meant to call the reader's attention to critical information at a point in the text that is relevant to the subject under discussion.**

Font Conventions Used in this Manual

The following fonts and colors are used throughout this document to help differentiate between file names, commands, outputs and document names (lower- & upper-case letter **o** and **zero**, shown right):

Filenames	Font: Courier New – 35-35-22	oO0
Linux Command Entered by the User	Font: Consolas - 196-89-17	oO0
Output from a Command	Font: Consolas – 0-128-128	oO0
Document_Name*	Font: Georgia – 83-129-53	oOo

∗ This and other documents can be found on our website:

https://www.thinklogical.com/downloads/

READ THE INSTRUCTIONS THOROUGHLY BEFORE STARTING ANY PROCEDURE!

REGULATORY & SAFETY COMPLIANCE

Class 1 Laser Information

TLX Matrix Switches, like all Thinklogical® fiber-optic products, are designed and identified as **Class 1 LASER products.** This means the maximum permissible exposure (MPE) cannot be exceeded when viewing the laser with the naked eye or with the aid of typical magnifying optics (magnifying glass, eye loupe, etc.).

CLASS 1 LASERS do not require any special precautions under conditions of normal use.

SFP Modules

Fiber-Optic Cables

Class 1 Lasers
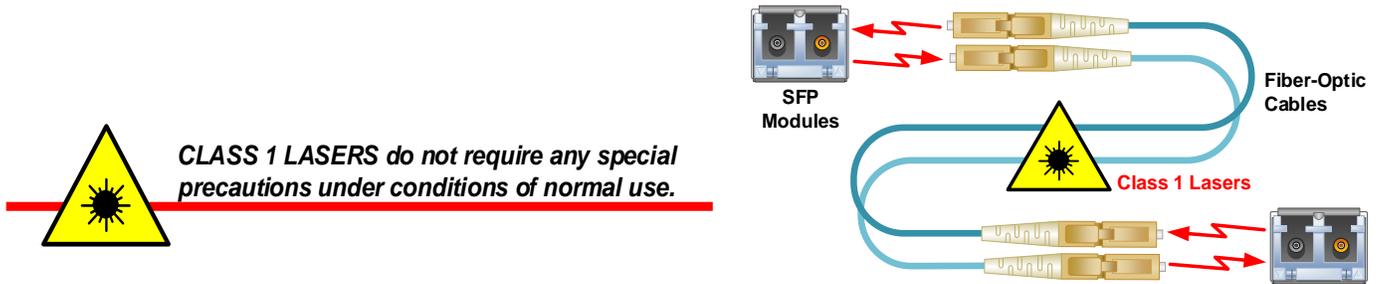
Symbols Found on Our Products

Markings and labels on our products follow industry-standard conventions. Regulatory markings found on our products comply with all required domestic and many international requirements.

Intertek
3072510
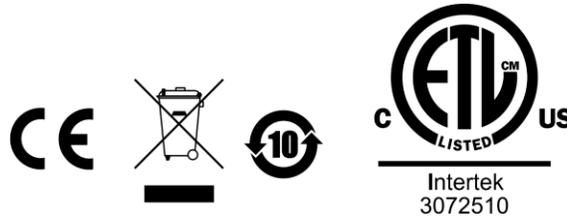
Regulatory Compliance

Thinklogical's® products are designed and made in the U.S.A. These products have been tested by a certified testing laboratory and found compliant with the following standards for both domestic USA and many international locations:

North America

Safety
UL 62368-1:2014Ed.2
CSA C22.2#62368-1:2014Ed.2

LASER Safety
CDRH 21 CFR 1040.10
Class 1 LASER Product
Canadian Radiation Emitting Devices Act, REDR C1370
IEC 60825:2001 Parts 1 and 2
Class 1 LASER Product

Electromagnetic Interference
FCC 47CFR Part 15 Subpart B: 2013 Class A
Industry Canada ICES-003: 2016 Ed. 6

Australia & New Zealand

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take corrective action.

European Union
Declaration of Conformity

Manufacturer's Name & Address: **Thinklogical,** A **BELDEN** BRAND
100 Washington Street
Milford, Connecticut 06460 USA

Thinklogical's products comply with the requirements of the Low Voltage Directive 2006/95/EC, the EMC Directive 2004/108/EC, the RoHS Directive 2011/65/EU, the WEEE Directive 2012/19/EU and carry the CE markings accordingly.

Standards with Which Our Products Comply

Safety

IEC 62368-1:2014Ed.2+C1
CB Scheme Certificate

Electromagnetic Emissions

CENELEC EN 55022:2010 +AC:2011

Electromagnetic Immunity

EN 55024:2011+A1
CENELEC EN 55032:2015
EN61000-3-2:2000 Harmonics
EN61000-3-3:2008 Flicker
EN 61000-4-2:2009 Electro-Static Discharge Test
EN 61000-4-3:2006 A1:2008, A2:2010 Radiated Immunity Field Test
EN 61000-4-4:2004 Electrical Fast Transient Test
EN 61000-4-5:2006 Power Supply Surge Test
EN 61000-4-6:2009 Conducted Immunity Test
EN61000-4-11:2004 Voltage Dips & Interrupts Test

Supplementary Information

The following statements may be appropriate for certain geographical regions and might not apply to your location:

- This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations. *Cet appareil numerique de la classe A respecte toutes les exigencies du Reglement sur le material brouilleur du Canada.*

- This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take corrective action.

- This equipment has been tested and found compliant with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications in which case the user may be required to make adequate corrective measures at their own expense.

- This Class A digital apparatus complies with Canadian ICES-003 and has been verified as compliant within the Class A limits of the FCC Radio Frequency Device Rules (FCC Title 47, Part 15, Subpart B CLASS A), measured to CISPR 22: 1993 limits and methods of measurement of Radio Disturbance Characteristics of Information Technology Equipment.

- The user may notice degraded audio performance in the presence of electro-magnetic fields.

- The customer shall verify that this product meets the appropriate national/regional requirements if those requirements for conducted/radiated electromagnetic emissions fall outside the scope of testing currently performed on this product.

Product Serial Number

Thinklogical products have a unique serial number, which includes a date-code, printed on an adhesive label that is affixed to the unit. The format for the date-code is *2 digits for the month*, dash, *2 digits for the year*, plus *at least four digits for a unique unit number.* For example: **07-230015** indicates the unit was built in the **7**th month of 20**23** and is unit number **15**.

Connection to the Product

Connections and installation hardware for our products use industry-standard devices and methods. All wiring connections to the customer equipment are designed to minimize proprietary or customized connectors and cabling. Power connections are made with regionally appropriate power cords and approved methods.

OVERVIEW

This document describes the command set used to control Thinklogical's TLX series of Matrix Switches. The commands are all ASCII based and are terminated with either a linefeed character or a carriage-return/linefeed pair. Port numbers are all 4 digits in length and filled with leading zeros (Example: port 12 is encoded as `0012`).

The TLX Matrix Switch API commands are based on the command set used by our VX Matrix Switch product line and detailed in the document: Matrix_Switch_ASCII_API.

API Version 4 Commands That Were Modified in Version 5

The following commands were modified in Version 5 of the API.

- *XDCSTYPE*　　　　Renamed *XTYPE*
- *XMAXCARDS*　Returns the maximum number of I/O cards, not half the maximum.

Uni-directional vs. Bi-directional

As used in this document, *uni-directional* is a connection that is made in only one direction, *from an input to an output*. Note that an input may be directed to multiple outputs at one time. The direction refers to data flow between a transmitter and a receiver or between a receiver and a transmitter (a backchannel).

Some of our VX Matrix Switches have the capability to create two connections at one time, creating a bi-directional connection. Bi-directional connections are still possible with TLX Series Matrix Switches (and in most cases necessary for the correct operation of the switch) but must be created by issuing two uni-directional commands. The TLX Series Matrix Switches are considered unidirectional devices.

⚠️ **Note: API commands shown in this manual are depicted in UPPER-CASE. This is for clarity purposes only. The latest API allows commands to be in upper or lower case. Bit 2 (0x04) of the XOPTIONS status result is set to a 1 if the Switch requires upper-case commands. This bit is there for the instances where a control system must interface with a different model or revision of our Switches.**

This manual reflects version V5.07.02 of the ASCII API.

CONVENTIONS

Port Numbers

- All port numbers are four places long, begin with 1 and have leading zeros. For example, port 15 is encoded as 0015.

- A port number of 4 zeros is used in response to a status command to signify that no port is in use. *A "zero" port number is not valid in a command string*.

- A port number of four 9s (9999) in used to signify ALL ports. It is not valid in a response. For example, to encode all output ports, use: O9999

- In the following sections, **xxxx** is used as a generic input port place holder; **yyyy** is used as the output port place holder.

⚠️ **Note: Do not use xxxx or yyyy in a command! Replace each with the appropriate input or output port number.**

Results

Results from commands are ASCII strings terminated with a newline (linefeed). The first character is an 'R', followed by a 4 digit, zero-filled length. The length includes the trailing newline. Following the length will be either 'OK', or 'ERnnnn'. OK signifies the command was successful, while ERnnnn is an error code. After the OK or ERnnnn, a comment may appear giving more detailed information.

In the case of a status command, the OK is followed by the status response.

⚠️ **Note: Users must wait for a result response before sending another command.**

There are several command-line options to available control the output from the API. These options are described in detail in the document:

Manual_Configuring_the_TLX_ASCII_Interface.

Two of the commonly used options are:

1. [--CR] Include a carriage return on each line output. (Useful for Windows)

2. [--verbose] Append a comment to each response with more information about an error code or repeat the successful command. Comments will start with the '#' character.

Examples of Verbose Output

Command:	CI0004O0007
Normal:	R0003OK
Verbose:	R0015OK#CI0004O0007

Command:	CI0004O0087
Normal:	R0007ER0007
Verbose:	R0072ER0007#Output port number 87 is out of range (1 thru 80): 'CI0004O0087'

COMMANDS

• Connection Commands

Connect

Connect one input port to one or more output ports. Connections are additive.
For example, connecting input 5 to output 7 will result in 7 being added to any existing connections to input 5. The 'i' and 'o' may be of either case.

Format: `CixxxxOyyyyO...`
- xxxx of all 9's is illegal.
- yyyy of all 9's will connect xxxx to all outputs.
- Connections will be made in the order specified.

Example Results: `R0003OK or R0007ERnnnn`

🛑 **Warning! When switching keyboard/mouse channels <u>it is now possible to connect one keyboard/mouse to multiple computers!</u>** *Unless the appropriate video connections are also made, you will be sending commands to computers that you are not currently viewing.* **<u>This could have disastrous results</u>!**

Disconnect

Disconnect one or more input or output ports. Disconnecting an output will only affect that port, but disconnecting an input will affect every output connected to that input. The 'i' and 'o' may be of either case.

Format: `Dixxxx…` or `Doyyyy…`
- This will disconnect all outputs connected to input port xxxx or will disconnect output port yyyy only.
- `DI9999` or `DO9999` will disconnect all the Upstream/Upper ports.
- It is not an error to disconnect a port that is not connected.

Example Results: `R0003OK` or `R0007ERnnnn`

⚠️ **<u>Note</u>: To disconnect ALL the ports, you may also use the XPUT on pg. [10] command without listing any ports.**

Macro

Sends a sequence of connect and disconnect commands as one command line. The syntax of this command is different from the other commands. Unlike the *connect* and *disconnect* commands, there is no `I` or `O` character to distinguish input part numbers from output part numbers. This command combines *connects* and *disconnects* in one string. The command may end with a semi-colon.

Format: `MiiiiOOOOiiiiOOOO...[;]`
- `iiii` - Input port number
- `oooo` - Output port number
- An input number of **0000** (all zeros) will disconnect the listed output port (same as the **DO** command)
- An output number of **0000** (all zeros) will disconnect the listed input port from all connected outputs (same as the DI command)
- An output number of **9999** will broadcast the input port to all outputs
- Unlike the **XPUT** command, the switch is not reset before the command is executed

To turn off all the ports, set the input to all zeros and the output to 9999.

An 'M' without inputs or outputs is valid. This allows external systems to determine if the API version supports the macro command.

Example: M0000001101230000
> disconnect output 11
> disconnect input 123

Example: M00009999
> disconnect all ports

Example Results: R0003OK or R0007ERnnnn

XPUT

Restore the entire switch connection state. The output from **XGET** on pg. [11] is used by this command.

Format: XPUTstr
- The XPUT command will turn off all outputs and then make the connections that are listed in 'str', which is the response that was returned from a XGET command.
- XPUT without any ports is valid and is interpreted as a command to disconnect all ports.

Example: XPUTI00010003I00020004I00100010000110012

Example Results: R0003OK or R0007ERnnnn

• Status Commands

Status

Return the connection status of an input or output port.

Format: Sixxxx
- Return the list of output ports that are connected to input port xxxx.
- If nothing is connected to port xxxx, 0000 will be returned.

Format: Soyyyy
- Return the input port number that is connected to output port yyyy.
- If nothing is connected to port xxxx, 0000 will be returned.

Example Results (SI):
- RnnnnOKIxxxxOyyyyOyyyyOyyyy... or R0007ERnnnn
- xxxx is connected to output(s) yyyy.
- 0000 means not connected.

Example Results (SO):
- RnnnnOKIxxxxOyyyy or R0007ERnnnn
- xxxx is connected to output yyyy.
- 0000 means not connected.

XSTATUSIO and XSTATUSOI

These commands return the current switch connection state. The switch state is returned as pairs of ports: *input port and output port* for the 'IO' command and *output port and input port* for the 'OI' command. A data pair is returned for each active connection. The semi-colon is always present in an 'OK' response.

These commands use four-digit, zero-filled decimal values. For example: the value 12 is encoded as: 0012. There is only one 'I' or 'O' in the response. It is immediately after the 'OK' and is there to identify which port (input or output) appears first in the data pair. The order in which the ports are listed is not defined.

> **Format:**   XSTATUSIO
> **Format:**   XSTATUSOI

This will return a (very) long string listing every connection. The connection list consists of pairs of port numbers.

Example Results:

- XSTATUSIO: R0027OKI0010012300120015;
- XSTATUSOI: R0027OKO0015001201230010;
- XSTATUSOI: R0011OKO;
- XSTATUSOI: R0019OKO0015001201230010;
- R0005OKI;
- R0005OKO;
- R0007ERnnnn

XGET

Like the *XSTATUSIO* and *XSTATUSOI* commands, this command returns the entire switch connection state. The output from this command is used by the **XPUT** command on pg. [10].

> **Format:**   XGET

- This will return a (very) long string listing every connection. The connection list   consists of a series of input port numbers, followed by output port numbers.
- The XPUT command requires all the characters from the response that come after the 'OK'.

Example Results:

- R0039OKI00010003I00020004I00100010I00110012
- R0030OKI00010003I00100010I00110012
- R0012OKI01230145
- R0003OK or R0007ERnnnn

- ## System Information Commands

XVERSION

Returns the API program version number.

> **Format:**   XVERSION
> **Example Results:**   R0009OKV5.00

XINSTALLED

Returns an inventory of installed I/O cards. A zero means the card is not installed and a one means the card is installed. The number of cards determines the number of zeros and ones returned and the number of cards varies for each TLX model. The cards are listed from left to right, with the leftmost digit used for the card that has port 1.

Format:	XINSTALLED	
Example Results:	R0006OK111	TLX48
	R0023OK00000000000100000000	TLX320

XMAXCARDS *(Modified from Version 4)*

Returns the maximum number of I/O cards in the switch.

This is a change from V4 of the API. V4 returned half the number of I/O cards, except for the MX48 which returned 3 (the actual number of cards).

Bit 3 of **XOPTIONS** may be used to determine if **XMAXCARDS** returns half the number of cards or the actual number of cards (the default). See **XOPTIONS** on pg. [15].

Model	Upstream Cards	Downstream Cards	Total Cards	Returned Value	XOPTIONS bit 3
TLX12	1	0	1	1	1
TLX24	1	0	1	1	1
MX48	3	0	3	3	1
TLX48	3	0	3	3	1
TLX48 2RU	2	0	2	2	1
TLX80	16	0	16	16	1
TLX160	16	0	16	16	1
VX320-Video	20	0	20	10	0
TLX320	20	0	20	20	1
VX640	32	0	32	16	0
TLX640	32	0	32	32	1

Table 1: XMAXCARDS Return Values

The TLX48 example below shows the message returned when the 'verbose' API command line option is enabled. Here, the API command is returned at the end of the response message.

Format:	XMAXCARDS	
Example Results:	R0017OK0003#XMAXCARDS	TLX48
	R0007OK0020	TLX320
	R0007OK0032	TLX640

XMAXPORTS

Returns the maximum number of non-blocking ports in the switch. This may also be interpreted as the maximum port number allowed in a command.

Format:	XMAXPORTS	
Example Results:	R0007OK0048	TLX48
	R0007OK0320	TLX320
	R0007OK0640	TLX640

XCTIME

The latest API now collects data on how long a port is connected. This is a cumulative amount, not how long the current connection has been in place. It is kept for both the input and output sides of a connection. For example, if the only input port ever used was port 1, then it would have a non-zero total, while all other input port totals would be zero. If input port 1 was only connected to output ports 3, 5 and 7, then those three ports would have non-zero totals and all other output port totals would be zero.

XCTIME output is configurable for cumulative days or seconds. The default is seconds. For days, use the `--xctime-day` configuration option. See XHELP on pg. [17].

Format:	XCTIMEnnnn
Example Results:	xget
	R0012OKI00010001
	xctime0001
	R0032OK0001,612817,612817#xctime0001
	xctime0001
	R0032OK0001,612837,612837#xctime0001
	xctime0001
	R0032OK0001,612841,612841#xctime0001
	xctime0001
	R0032OK0001,612849,612849#xctime0001
	xput
	R0008OK#xput
	xctime0001
	R0032OK0001,614003,614003#xctime0001
	xctime0001
	R0032OK0001,614003,614003#xctime0001
	ci0001O0002
	R0015OK#cI0001O0002
	xctime0001
	R0032OK0001,614007,614003#xctime0001
	xctime0001
	R0032OK0001,614011,614003#xctime0001

Input 1 is connected to output 1 in this example (see XGET output). Each time the XCTIME command is sent, the connection times are increasing. Then the ports are disconnected (XPUT). As can be seen, the connection times stay the same. Finally input 1 is connected to port 2. As shown, input 1 times are increasing, but output port 1 times do not change.

XTYPE *(New to Version 5)*

Returns a string containing the TLX model. This was formerly the command XDCSTYPE but has been renamed. The old name will still work.

Format:	XTYPE
Example Results:	R0014OKTLX48Switch
	R0015OKTLX320Switch
	R0015OKTLX640Switch

XLASTEVENT

Returns a time-stamp string that was set the last time a connection was made or broken. This can be used to determine if the switch status has changed since the last XLASTEVENT command was issued.

Format: XLASTEVENT

Example Results: R0027OKThu Jul 1 11:23:52 2010

XPORTCONFIG

Returns a comma delimited list of three numbers: NU, NB, OFF.
The first number (NU) is the maximum number of uni-directional paths in the system. The second (NB) is the maximum number of bi-directional paths and the third is currently defined as zero. Note: TLX switches are uni-directional.

Format: XPORTCONFIG

Example Results:

R0017OK0048,0000,0000	TLX48
R0017OK0320,0000,0000	TLX320
R0017OK0640,0000,0000	TLX640

XRESET

Resets the internal switch hardware to its power on state.

Format: XRESET

Example Results: R0003OK or R0007ERnnnn

XALARM

Returns the Matrix Switch hardware alarm status.
The return value is a decimal number that represents a bit-map of the actual alarm bits. For example, if 19 is returned, the binary format will be: 10011. This shows that 3 alarms are active (3 bits are '1'). The leftmost bit in the example is bit 4, followed by bits 3, 2, 1 and 0 (the rightmost bit). Bit 0 corresponds to alarm 1, bit 1 to alarm 2, etc.

The alarm bits are defined in the TLX Matrix Switch manual and vary depending on the model.

Format: XALARM

Example Results: R0007OK0522   TLX320
        Decimal 522 is 1000001010 in binary (bits 9, 3 and 1 are 'on')

Alarm Bit table for the TLX640:

Bit 0 – Power Supply 1 (left)	**Bit 5** – Temperature Warning
Bit 1 – Power Supply 2	**Bit 6** – Temperature Shutdown
Bit 2 – Power Supply 3	**Bit 7** – CPU
Bit 3 – Power Supply 4	**Bit 8** – Input/Output Card(s)
Bit 4 – Fan(s)	**Bit 9** – Any of the above

XQUIT

Ends the network connection.

XCRON and XCROFF

Enables or disables sending CR's on each line. XCRON is typically used when a (Windows) telnet client connecting to the switch requires each line to end with a CR/LF pair.

Format:	XCRON or XCROFF
Example Results:	R0003OK

XOPTIONS

This command returns a numeric response that is a bit map of options available in the version of the API. The value returned is a four-digit decimal number of the binary bit map. For example, if the value returned was 0015, then bits 0, 1, 2, and 3 would be on (bit 0 is the lsb).
The following bits are defined:

0: Reserved for HDX Matrix Switches.

1: XTEST2 command is allowed. This is set for the TLX320 and TLX640.

2: Only UPPER-CASE commands are allowed.

3: XMAXCARDS returns the total number of cards allowed in the Matrix Switch (not half the number as it formerly did).

4: Switch supports point-to-point connection mode.

5: If set, the Switch may send status updates using a Multicast IP address instead of a broadcast IP address.

6: If set, the Switch supports collection on port connection durations. See XCTIME on pg. [13].

Format:	XOPTIONS
Example Results:	R0007OK0007
Sample response:	

- R0062OK0120#xoptions:Actual_Card_Count P2P Multicast Connect_Time

XGETLOS

This command returns the loss of signal (LOS) status of the SFPs in human-readable format. The value returned is the port number and SFP LOS status TRUE if there is a loss of signal and FALSE if there is no loss of signal. The port inquiry is specified by the four-digit port number (nnnn). nnnn = 0000 returns ports only that have LOS = TRUE. nnnn = 9999 returns all ports.

Format:	XGETLOSnnnn
Example Results:	port: nnnn LOS=TRUE

- R0005OKL0 port 14 LOS = FALSE

XLOS

This command returns the loss of signal (LOS) status of the SFPs in a binary bit map format. The value returned is a consecutive bit representation of the SFP LOS status. 1 = LOS, 0 = no-LOS. The port inquiry is specified by the four-digit port number (nnnn). nnnn = 9999 returns all ports.

Format:	XLOSnnnn
Example Results:	XLOS0014

- R0005OKL0
  XLOS9999
- R0028OKL11111111111101111111111

XTXPWR

This command returns the transmitter power of SFPs in a numerical format. The value returned is a four-digit representation of the SFP transmitter power in microwatts (uW). The port inquiry is specified by the four-digit port number (nnnn). nnnn = 9999 returns all ports.

Format: XTXPWRnnnn
Example Results: XTXPWR0014

- R0008OKT0451
      XTXPWR9999
- R0100OKT0000000000000000000000000000000000000000000000000000045100000000000
  00000000000000000000000000000000

XRXPWR

This command returns the receiver power of SFPs in a numerical format. The value returned is a four-digit representation of the SFP receiver power in microwatts (uW). The port inquiry is specified by the four-digit port number (nnnn). nnnn = 9999 returns all ports.

Format: XRXPWRnnnn
Example Results: XRXPWR0014

- R0008OKR0451
      XRXPWR9999
- R0100OKR0000000000000000000000000000000000000000000000000000045100000000000
  00000000000000000000000000000000

XHELP

Print a list of valid commands. This is a multi-line response that does NOT start with OK or ER or end with a length**. It is intended as a debugging aid and not for use in a production environment**. It does not follow the format rules for command responses. **Format:** XHELP

Sample response:

```
Version: V5.07.07  (build: 8)
Usage: tlx320api [options]
                          ----  network options  ----
-L|--listen[=]port       listen on this port, all addresses     (default: 17567)
-N|--connections[=]n     set the maximum number of open connections allowed   (default: 128)
   --mcast[=IP address]  replace broadcasts with multicast to this IP address (default:
                         239.255.13.9)
   --noexternalapi       only listen on 'localhost' for API connections
   --noexternalbcast     send the port status only on 'localhost'
                          ----  serial options  ----
-S|--serial=device       use this serial device    (default: /dev/ttymxc1)
   --serial=none         disables the API serial port /dev/ttymxc1
-B|--baud[=]speed        sets serial baud rate      (default: 9600)
                          ----  generic options  ----
   --CR                  output CRLF instead of just LF (network connection only)
   --facility[=]name     syslog facility reporting level        (default is local4)
                         valid names: auth, daemon, user, local0 through local7
                         see the man page for rsyslog.conf for more information
-D|--debug               write debug messages to the log file (multiple options increase the
                         debug level)
   --api                 write API messages received to the log file     (level: NOTICE)
   --avr                 write control commands to the log file          (level: NOTICE)
   --clog                write connection status changes to the log file (level: NOTICE)
   --log_ip              include the IP address with each API message that is logged  (level:
                                                                          NOTICE)
   --delay[=]delay       in ms, how long an output must remain off, default is 300 ms.
                         minimum is 50ms, maximum is 1000ms, 0 will disable the delay
-b|--bcast[=]period      in ms, how long between port status broadcasts, default is 4000 ms.
                         minimum is 500, maximum is 15000, 0 will disable the broadcast
                         if multicast is enabled, it will use this time setting
                         --bcast=0 will disable: broadcasts, multicasts, and the 'restore
                         connections' feature to disable network broadcasts but keep the
                         'restore' feature, use the --noexternalbcast option
   --idle[=]seconds       network connections idle for at least these many seconds are
                         candidates to be forcibly closed when a new connection is made and there
                         are no available sockets. Setting it to 0 will disable this feature. The
                         default setting is 60 seconds.
-V|--verbose              enable error text in responses
-h|--help                 display this help and exit
-v|--version              output version information and exit
-d|--xctime-day           display xctime data in days (seconds default)


 Default (no options) is to listen on socket 17567 at all IP addresses
                         send to socket 27567 at 127.0.0.1
                         accept commands from the RS232 port
                         broadcast switch status every 4000 milliseconds on port 17564

   signal SIGUSR1 will toggle api debug logging      (--api)
   signal SIGUSR2 will toggle control debug logging  (--avr)
   signal SIGHUP will force the API to reread the P2P csv files located in /var/local/router/p2p/
```

• Diagnostic Commands

These commands are used to test the ability of the switch to make connections. They will connect each of the input ports to each of the output ports in one of three ways, as described below.

XTEST1

Connects all the ports on the Matrix Switch (*n* to *n*).
Connects input 1 to output 1, input 2 to output 2, …input n to output n...

Format:	XTEST1
Example Result:	R0003OK

XTEST2

Connects all the ports on the TLX320 and TLX640 Matrix Switches.

This test is only available on the TLX320 and TLX640, due to their underlaying hardware design and will activate a set of hardware paths that do not exist on the other TLX models.

On the TLX320, it connects:

> input 1 to output 161, input 2 to output 162, …input 160 to output 320…
> input 161 to output 1, input 162 to output 2, …input 320 to output 160...

On the TLX640, it connects:

> input 1 to output 640, input 2 to output 639, …input 640 to output 1...

Format:	XTEST2
Example Result:	R0003OK

XTEST3

Connects all the ports on the Matrix Switch for testing CATx Extenders.
Connects input 1 to output 2, input 2 to output 1, …input n-1 to output n, output n to input n-1...

Format:	XTEST1
Example Result:	R0003OK

⚠️ **Note: To verify that all the outputs on the switch are working, the command Cixxxxo9999 will connect input xxxx to ALL the output ports. The XTEST commands require an input signal on ALL inputs, whereas the Cixxxxo9999 only requires a signal on input xxxx.**

![thinklogical - A BELDEN BRAND]

TLX Matrix Switch Port Numbering

Connections on a TLX Matrix Switch can be made between any ports on any card. When making or breaking connections, be sure to identify the 'direction' of the connection, which refers to the extenders' data flow, from transmitter to receiver, or receiver to transmitter.

- **Transmitter to Receiver** data is an *'upstream to downstream'* connection.
- **Receiver to Transmitter** data is a *'downstream to upstream'* connection (also called a *'backchannel'*).

The port numbering schemes for each of the TLX Matrix Switch models,**TLX12, TLX24, TLX48, TLX48 2RU, TLX80, TLX160, TLX320, TLX640 and TLX1280,** are shown below.
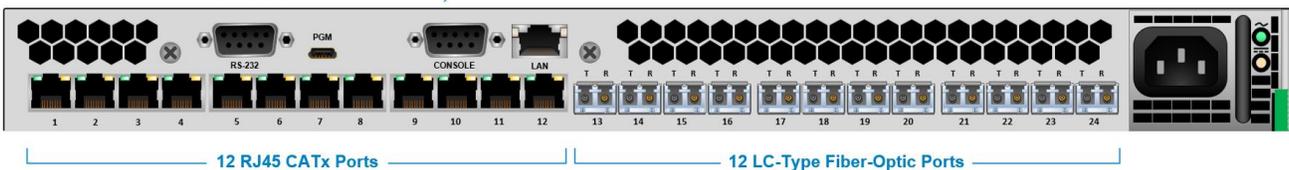
The TLX12

SFP PORT LABELS: T=Transmit, R=Receive

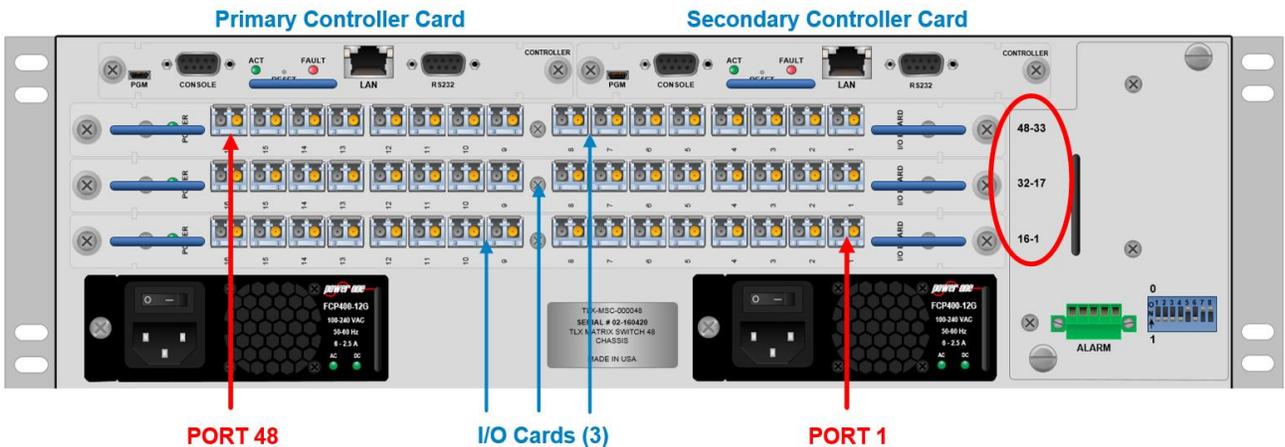**12 LC Fiber-Optic Ports**

PORTS 1 through 12 →

The TLX24

SFP PORT LABELS: T=Transmit, R=Receive

12 RJ45 CATx Ports   **12 LC-Type Fiber-Optic Ports**

PORTS 1 through 24 →

The TLX48

Primary Controller Card   **Secondary Controller Card**

PORT 48   **I/O Cards (3)**   **PORT 1**

The TLX48 2RU

Back-up Controller Card   **CTRL 2**
Primary Controller Card   **CTRL 1**

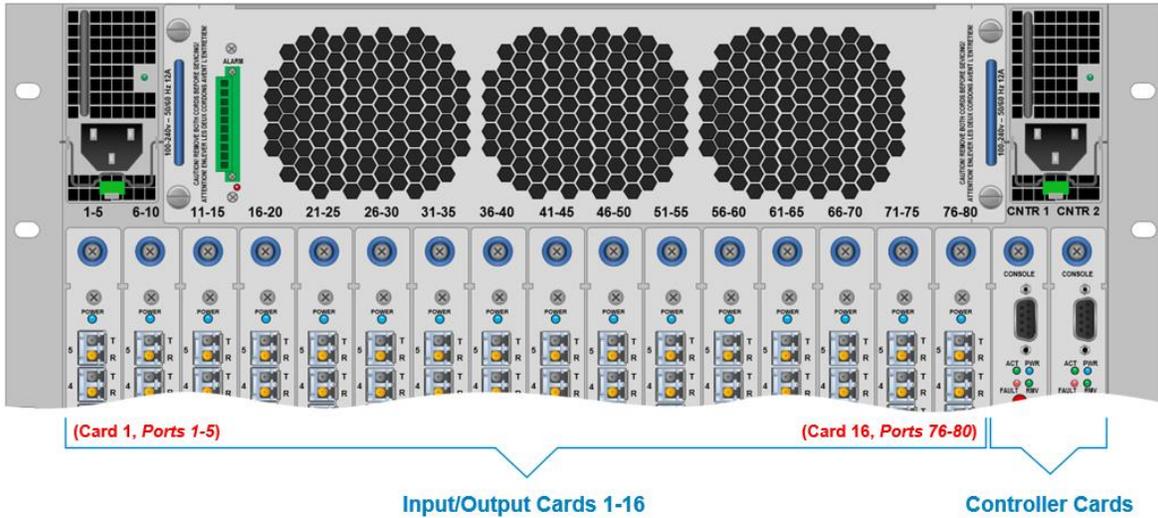**PORT 1**   **PORT 48**
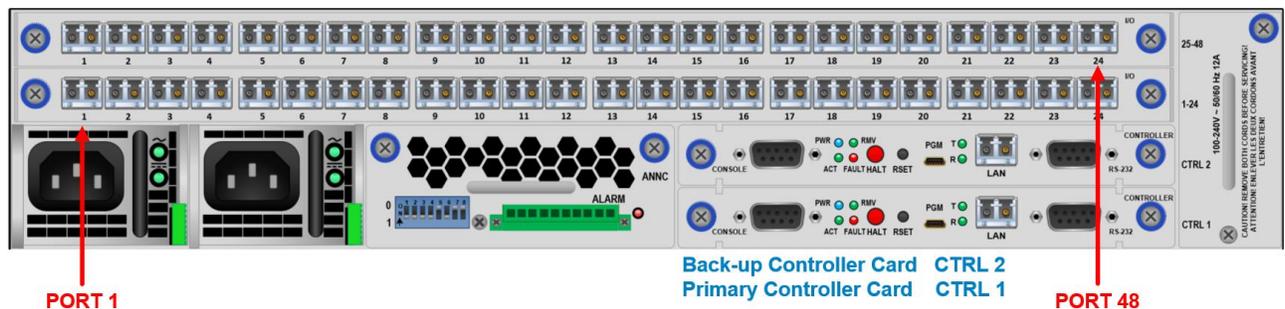
TLX48 and TLX48 2RU Input/Output Cards are mounted horizontally.
Port numbers begin at the bottom card.

The TLX80

(Card 1, *Ports 1-5*)   (Card 16, *Ports 76-80*)

Input/Output Cards 1-16   Controller Cards

TLX80 Port numbers begin at the bottom and start with the left I/O Card.

The TLX160

(Card 1, *Ports 1-10*)   (Card 16, *Ports 151-160*)

Controller Cards   Input/Output Cards 1-16

TLX160 Port numbers begin at the bottom and start with the left I/O Card.

Controller Cards

The TLX320

Port 16   *Port numbers begin at the bottom and start with the left I/O Card*   Port 320
⇧   ⇧
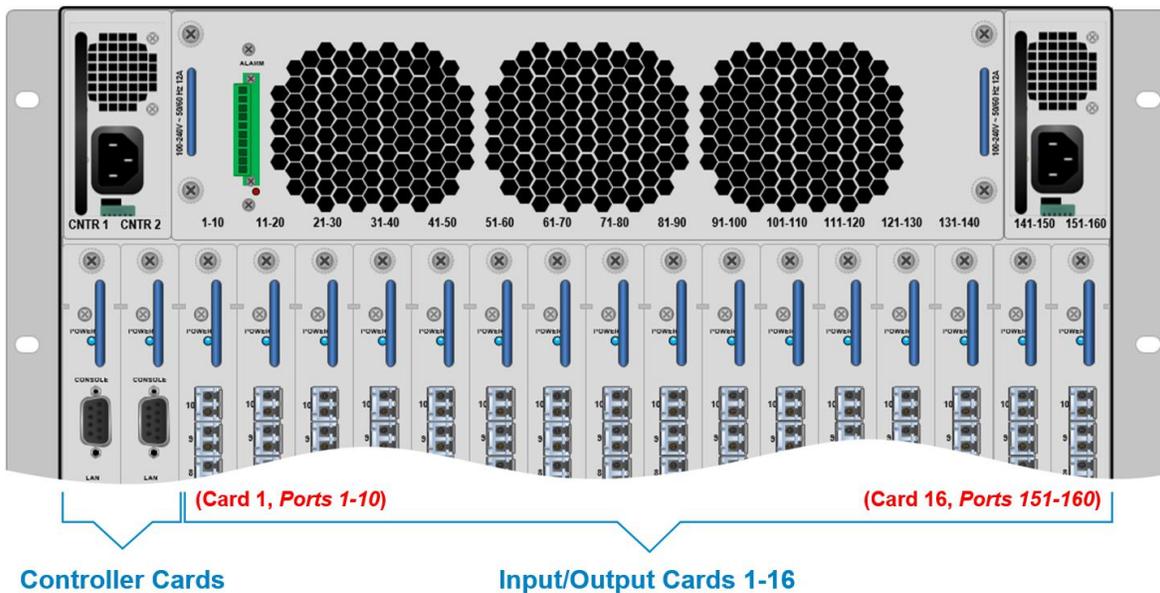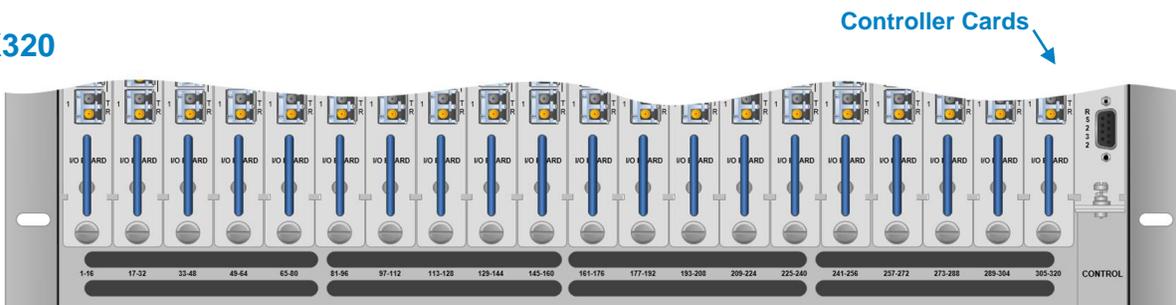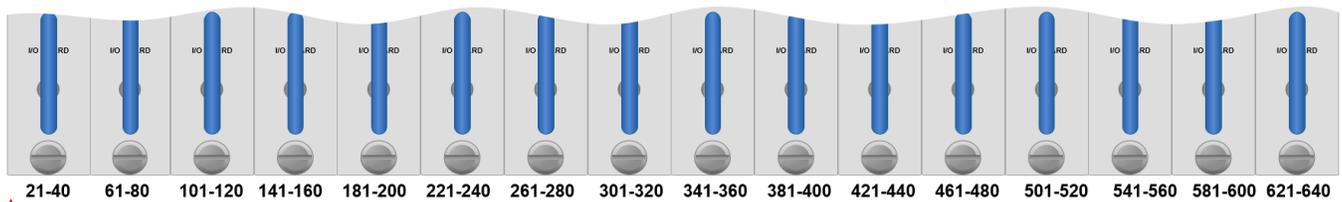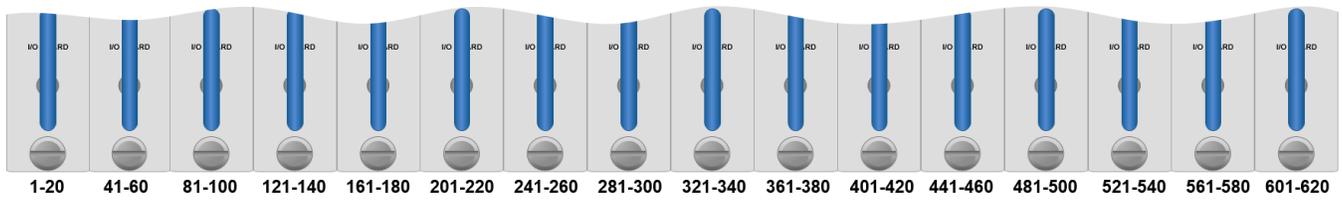Port 1   Port 305

The TLX640

Upper Card Cage I/O Card Numbering

| 21-40 | 61-80 | 101-120 | 141-160 | 181-200 | 221-240 | 261-280 | 301-320 | 341-360 | 381-400 | 421-440 | 461-480 | 501-520 | 541-560 | 581-600 | 621-640 |

Lower Card Cage I/O Card Numbering

| 1-20 | 41-60 | 81-100 | 121-140 | 161-180 | 201-220 | 241-260 | 281-300 | 321-340 | 361-380 | 401-420 | 441-460 | 481-500 | 521-540 | 561-580 | 601-620 |

TLX640 Port numbers begin at the Lower Card Cage and start with the left I/O Card *(Ports 1-20), proceeding up to the Upper Card Cage's left I/O Card (Ports 21-40).*

Port numbers then move to the second I/O Card on the Lower Card Cage (Ports 41-60) and proceed up to the second I/O Card on the Upper Card Cage (61-80), etc.
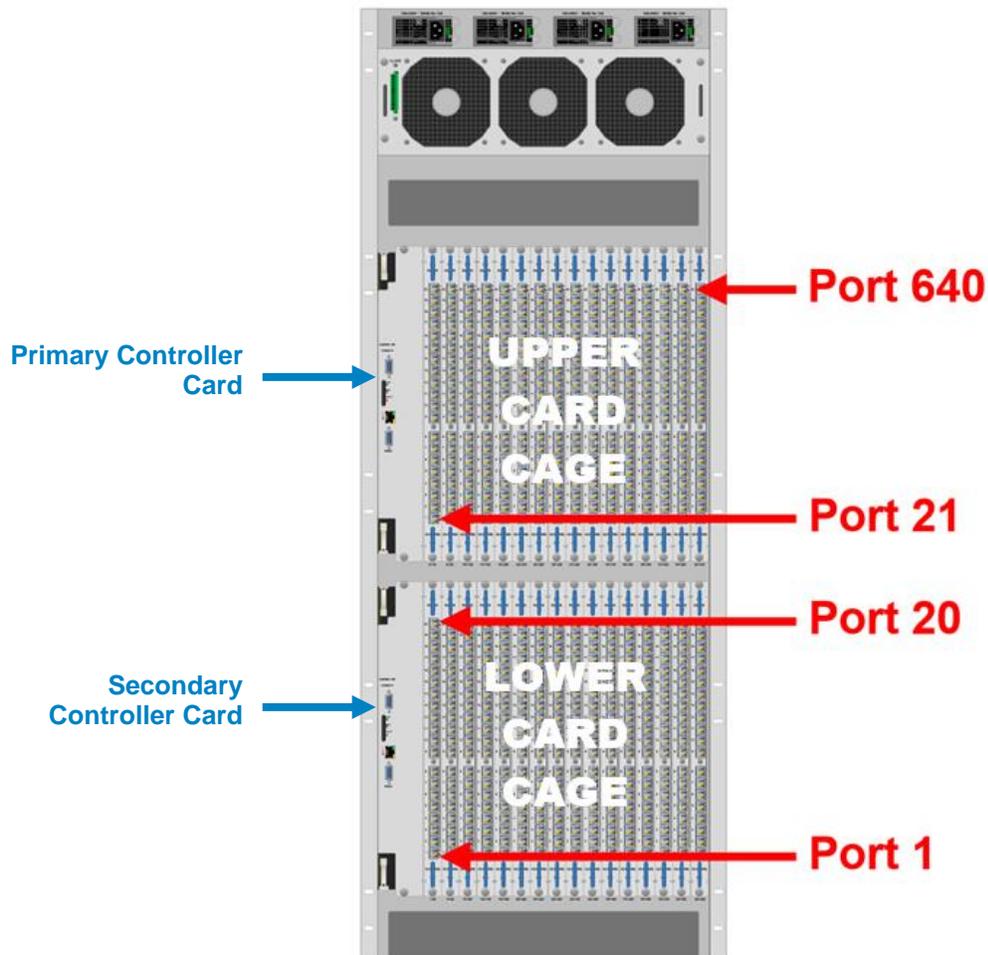
The TLX1280

Port numbering begins at the bottom of the TLX1280's chassis and starts with Card 1, the leftmost I/O card of the Lower Card Cage. Card 2 is directly above Card 1 in the Upper Card Cage. When installing fewer than 40 I/O Cards, cards slots may be chosen at the user's discretion. Each card slot has a **port number designation printed above the card** for easy reference.
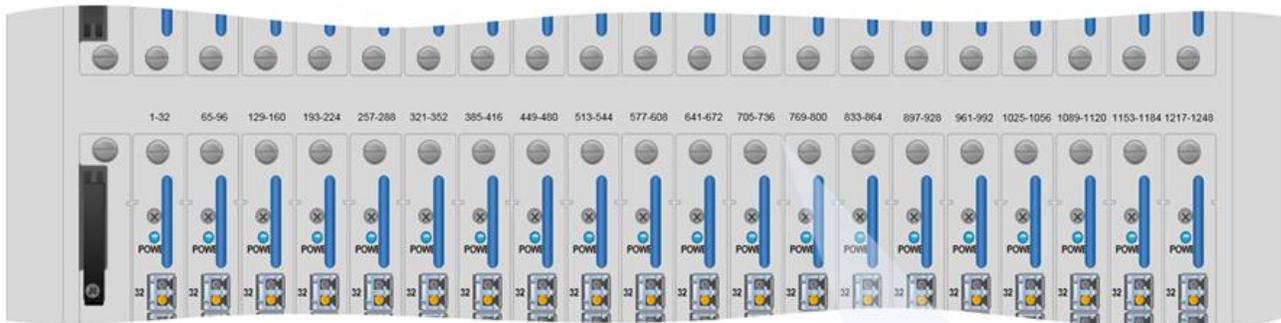

Port numbers begin at the bottom and start with the left I/O Card
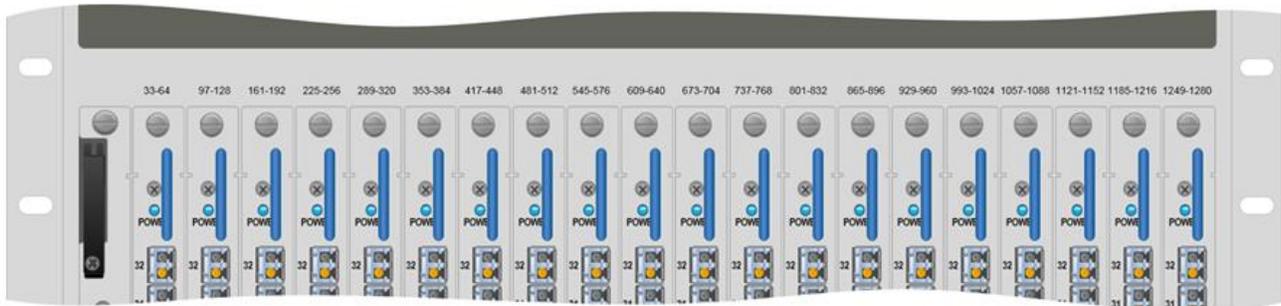
Port 64 ⇧ Port 33 — Upper Card Cage — Port 1280 ⇧ Port 1249

Port 32 ⇧ Port 1 — Lower Card Cage — Port 1248 ⇧ Port 1217

64 → ← 1280
33 →
32 → ← 1248
Port 1 →
65

Upper Card Cage
Even numbered I/O cards 2,4,6…40
20 Cards x 32 ports

Lower Card Cage
Odd numbered I/O cards 1,3,5…39
20 Cards x 32 ports
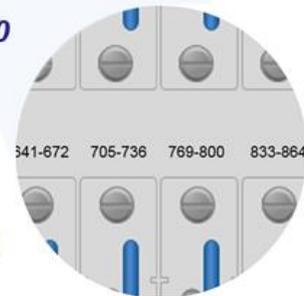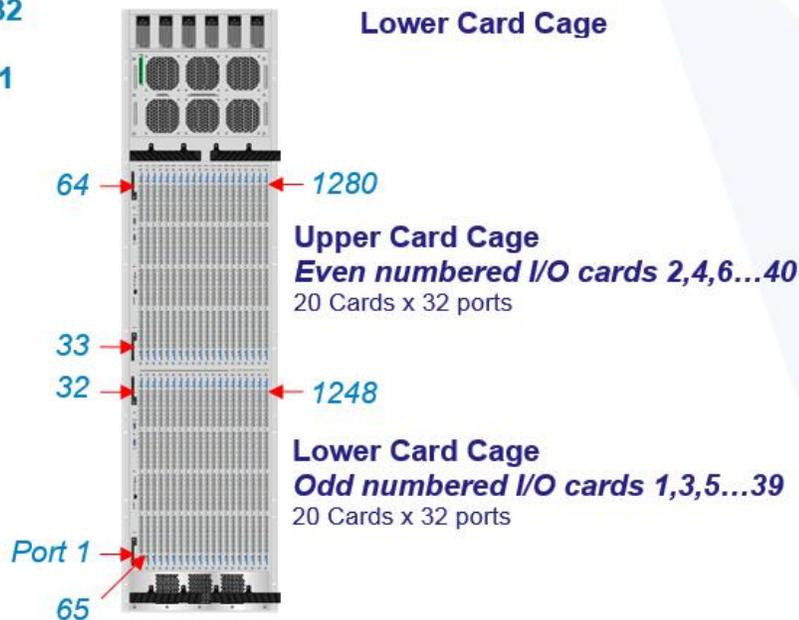
Error and Status Codes

1.1	0001	– Syntax error.
1.2	0002	– The command is missing an input port field.
1.3	0003	– The command is missing an output port field.
1.4	0004	– The command has multiple input fields, but only 1 is allowed.
1.5	0005	– The command has multiple output fields, but only 1 is allowed.
1.6	0006	– The input port value is out of range.
1.7	0007	– The output port value is out of range.
1.8	0008	– The command contains an invalid character.
1.9	0009	– A port value of 9999 is not allowed in this command.
1.10	0010	– **Not used.** (An SNMP error occurred that only a DCS switch will generate.)
1.11	0011	– *An error occurred while attempting an internal fork command.
1.12	0012	– **Not used.** (API received a command that is not allowed.)
1.13	0013	– *Not enough memory to process the command
1.14	0014	– *File I/O error; an error occurred while reading or writing a file.
1.15	0015	– *The switch control process is not responding.
1.16	0016	– The command references multiple chassis, but the Switch only has one.
1.17	0017	– A macro was sent with a semi-colon (**;**) but the switch is unidirectional. Unidirectional switches do not allow port numbers after a semi-colon.
1.18	0018	– **Not used.**
1.19	0019	– **Not used.**
1.20	0020	– *An internal memory allocation error occurred.
1.21	0021	– Port out of range error.

Error 10:   This error code is no longer in use.

Error* 11,13,14,15,20: Internal program error: Contact Thinklogical® if you get this message.

Error 12,18,19:   API V5 does not use this error code.

THINKLOGICAL SUPPORT

Sales Support

Please contact our expert sales staff in Milford, CT **Monday-Friday from 8:30am to 5:00pm**, Eastern Time Zone. If leaving a voice message, please provide a preferred time to call back.

- **Telephone: 1-203-647-8700** *or* **1-800-291-3211**
- **Fax: 1-203-783-9949**

Customer Support

- **Website:** https://www.thinklogical.com

Check out our website for current products, support documents and useful information about all the products and services we offer, including:

- **Technical Specification Sheets**
- **Quick-Start Guides**
- **Product Manuals** (for viewing online or for download)
- **Chat live** with a Customer Service Representative.

Technical Support

For product support, technical issues/questions, product repairs or request for Return Merchandise Authorization, use any of the following methods:

- **Email:** support@thinklogical.com
- **Telephone: 1-203-647-8700** *or* **1-800-291-3211**
- **Fax: 1-203-783-9949**
  Please specify the issue on your fax cover sheet and please provide contact information.
- **Website:** https://www.thinklogical.com **Chat live** with a Customer Service Representative.

Product Support

Warranty

Thinklogical warrants this product against defects in materials and workmanship for a period of one year from the date of delivery, with longer terms available at the time of purchase on most products. Thinklogical and its suppliers disclaim all other warranties. Please refer to your product invoice for the Warranty Terms & Conditions.

The remedy for defects shall be the repair or replacement of the product, provided that the defective product is returned to the authorized dealer within a year from the date of delivery.

If you wish to return your device, contact the Thinklogical-authorized dealer where you purchased the device, or if you purchased directly, call Thinklogical at **1-203-647-8700** or **1-800-291-3211**.

Return Authorization

If you must return a product to Thinklogical directly, please call us and let us know. Customer Support will ask you to describe the issue and will provide you with a **R**eturn **M**erchandise **A**uthorization **number** (RMA#). Pack the device in its original box, if possible, and return it with the RMA# printed on the outside of the box. **DO NOT return a product to Thinklogical without a *Return Merchandise Authorization*.**

Our Address

For any product issues or questions, or for technical assistance, please call us and let us help. If you need to write us or return a product, please use the following address:

Please include the Return Merchandise Authorization number: **Thinklogical,** A **BELDEN** BRAND
100 Washington Street
Milford, CT 06460 USA
Attn: *RMA#*

Appendix A: Switch Status Broadcast

The API program will periodically broadcast the current switch connection map over the network. This data may be used to keep external systems in sync with the switch. Previously, either the XGET or XSAVE command was needed to obtain the connection map. In systems with many external controls trying to stay synchronized to the Matrix Switch, the switch would spend a lot of its resources trying to answer these status requests.

It is now possible to replace the use of 'broadcast' with the use of 'multicast'. **The advantage of using multicast over broadcast is that multicast packets will be routed past the local subnet, whereas broadcast packets are not routed.**

You may configure the frequency of these messages or disable them altogether.

More information about this feature can be found in the manuals Matrix_Switch_Interfaces and Manual_Configuring_the_TLX_ASCII_Interface.

Appendix B: Sample Commands

CI0005o0010	Connect Input 5 to Output 10
Si0004	Get the connection status of Input 4
xputI00010003I00020004	Turn off all outputs. Connect Input 1 to Output 3 and connect Input 2 to Output 4

Appendix C: Connecting Extenders

The following are sample commands needed to connect selected transmitters and receivers through a TLX Matrix Switch. These examples will reference the appropriate Quick Start Guide.

VEL-24 through a TLX320

Quick Start Guide: VX320Video_VEL-24_VEL-38_QSG

Number of fibers: **3**: L1, L2, L3

Backchannel fiber: L2 (data from receiver to transmitter)

Tx24 fiber connections	Rx24 fiber connections
• L1 -> 14R	L1 -> 15T
• L3 -> 16R	L3 -> 16T
• L2 -> 14T	L2 -> 15R

Commands: (all upper case)

CI001400015   Connects L1 video to RX L1
CI001600016   Connects L3 video to RX L3
CI001500014   Connects L2 data to RX L2 (backchannel)

Assume a second receiver is now connected as follows:

- L1 -> 25T
- L3 -> 26T
- L2 -> 25R

The commands to connect this receiver to the transmitter are:

CI001400025   Connects L1 video to RX L1
CI001600026   Connects L3 video to RX L3

Note: Receiver 2 (L2 backchannel data) is **NOT** connected.

- Receiver 1 has full keyboard/mouse/USB/speaker access.
- Receiver 2 has sound (speakers) but no keyboard/mouse/USB.

To move the keyboard/mouse/USB from Rx 1 to Rx 2, issue the following commands:

DI0015   Disconnects RX 1 L2 (backchannel)
DI0025   Disconnects RX 2 L2 (backchannel)
CI002500014   Connects RX 2 L2 data to TX 1 (backchannel)
    or
M001500000015000000150014   Macro command that combines all three commands

The two `DI` commands are sent to ensure the keyboard/mouse data only goes to a single transmitter. If you are certain that there are no other L2 connections in place, you may eliminate them.

🛑 **Warning! Eliminating the `DI` commands will open the possibility of sending keystrokes and/or mouse commands to multiple servers at the same time – <u>a situation that will lead to disaster!</u>** *Always ensure that no other L2 backchannel connections are in place before eliminating the* `DI` *commands!*

VEL-38 through a TLX320

Quick Start Guide: VX320Video_VEL-24_VEL-38_QSG

Number of fibers: 5, L1, L2, L2, L3, L4, L5

Backchannel fiber: L2 (data flows from receiver to transmitter)

Tx38 fiber connections	Rx38 fiber connections
• L1 -> 8R	L1 -> 9T
• L3 -> 10R	L3 -> 10T
• L4 -> 11R	L4 -> 11T
• L5 -> 12R	L5 -> 12T
• L2 -> 8T	L2 -> 9R

Commands: (all upper case)

CI000800009	Connects L1 video to RX38 L1
CI001000010	Connects L3 video to RX38 L3
CI001100011	Connects L4 video to RX38 L4
CI001200012	Connects L5 video to RX38 L5
CI000900008	Connects L2 data to TX38 L2 (backchannel)

Now connect the TX24 to the RX38:

DI0009	Disconnects RX38 L2 (backchannel)
DO0010	Disconnects RX38 L3 (unused)
DO0012	Disconnects RX38 L5 (unused)
CI001400009	Connects TX24 L1 video to RX38 L1
CI001600011	Connects TX24 L3 video to RX38 L4

or

M0009000000100000001200000014000900160011 Macro command that combines all three commands

Appendix D: Point-to-Point Switching Mode

Point-to-Point Switching Mode, or P2P, disables broadcasting by ensuring that input ports are restricted to one output port at a time on the same Matrix Switch. To specify which inputs will be P2P, the user must provide a P2P definition file with a table defining each input that will have an output restriction on the Matrix Switch.

Each entry in the file represents an input port that will be restricted to one output in P2P mode. One or more entry per line is allowed. Blank lines are also allowed. The only characters allowed in the file are the digits 0 through 9, commas and spaces. Tables may be configured at the user's discretion.

Examples of ways to set input ports 1- 3 to P2P mode are:

Ex. 1: 1,2,3   **Ex. 2:** 1   **Ex. 3:** 1,2   **Ex. 4:** 1   **Ex. 5:** 1
                         2,3   3   2
                                                    2,3   3

⚠️ **Note: The shortcut value 9999 may be used to indicate "all input ports."**

The P2P Switching Table file is stored on the Controller Card at:

`/var/local/router/p2p/upstream.csv`

To verify that the upstream.csv file has been detected by the system, the user must be at the administrative level of the system and run `tlxid` by issuing the following commands:

```
su
root
tlxid
```

If the **upstream.csv** file is found, the screen will indicate `point-to-point file found`

If the **upstream.csv** file is not found, the screen will indicate `point-to-point file not found`.

At system power-up, when initial boot-up is complete, the **Primary Controller Card** will only evaluate its P2P Table (**upstream.csv** file) once upon becoming active. The **Back-Up Controller Card** will NOT evaluate its P2P Table (**upstream.csv** file) at initial boot-up, but it will evaluate the table when a switch-over occurs from Primary Active to Back-Up Active.

If an **upstream.csv** file is found, the following log entry is made to the **centOS journal**:

`imxswitch tlxapi[981]: parsing P2P csv file /var/local/router/p2p/upstream.csv`

If no file is found, then the following log entry is made:

`imxswitch tlxapi[982]: vxASCIIapi.c@4425 configure_api_shared(): /var/local/router/p2p/upstream.csv stat failed: No such file or directory`

The inactive Back-Up Controller Card will not verify its P2P Table (**upstream.csv** file), so it will not log error messages with current time-stamp entries until it becomes active. Also, any errors that occur during the P2P Table evaluation process will be logged in the `/var/log/errors.log` file as follows:

`imxswitch tlxapi[984]: parse_api_csv_file.c@77: Error: 'Invalid character `-` in file' at line 1 column 2 of csv file /var/local/router/p2p/upstream.csv  data: '-2`

Note that the example above shows an invalid character entry of -2 in the **upstream.csv** *file.*

For access to the **errors.log** file via SSH, refer to *The Network Interfaces* section of the Matrix Switch manual for correct IP addresses of Controller Cards when in Primary Active or Back-Up Active mode.

⚠️ **Note: Users should review the `errors.log` file regularly and correct any reported errors.**

To verify the system's **P2P policy**, Thinklogical recommends the following:

1) Review the **centOS journal** file, as well as the **errors.log** file, on the active Controller Card and correct any errors in the P2P Table before implementing single-output control domains on the same Matrix Switch.

2) Fully verify the **P2P Policy** on the active Primary Controller Card before implementing single-output control domains on the same Matrix Switch.

3) In a redundant system, make the Back-Up Controller Card active by disconnecting the LAN cable from the Primary Controller Card's LAN port. The Back-Up Controller Card, upon becoming active, will evaluate its P2P Table. Check the **centOS journal** file as well as the **errors.log** file on the Back-Up Controller Card for any errors in the P2P Table and correct them before implementing single-output control domains on the Matrix Switch using the Back-Up Controller Card.

4) Fully verify the **P2P Policy** on the Back-Up Controller Card before implementing single-output control domains on the same Matrix Switch.

To review the **centOS journal** file, use the following command: `journalctl | grep p2p`

There are cases where updates to the P2P Table must be made in an active system. When an update is made to the table, the Controller will not evaluate the updated table until the following procedures are followed:

- When updates are made to the P2P Table in a **non-redundant system** *(This procedure WILL be disruptive to system connections):*

  1) Update the P2P Table of the Primary Controller Card.
  2) Take the Primary Controller Card out of service. (Refer to the Matrix Switch manual.)
  3) Power-cycle the system. (Refer to the Matrix Switch manual.)

⚠️ **Note: This procedure WILL be disruptive to system connections**.

- When updates are made to the P2P Table in a **redundant system** *(This procedure will NOT be disruptive to system connections):*

  1) Update the P2P Table of the inactive Back-Up Controller Card.
  2) Take the Primary Controller Card out of service by following guidelines in the "Safely Remove an Active Controller Card" section of the Matrix Switch manual. This will cause the Back-Up Controller Card to become active and evaluate its P2P Table.
  3) Update the P2P Table of the inactive Primary Controller Card with the same table used for the Back-Up Controller Card.
  4) Extract and re-insert the Primary Controller Card into the chassis to cause the system to make the Primary Controller Card the active controller and begin using the updated P2P Table. Ensure that the LAN connection to the Primary Controller Card is restored promptly.

⚠️ **Note: When using a Back-Up Controller configuration, both controllers must have the same P2P Table file(s) to maintain system security.**

Point to Point Switching is disabled when the P2P Table file is removed. By default, when there is no P2P file, an input can connect to any number of outputs. All Switches are shipped without a P2P file stored on the Controller Card and therefore allow for multicasting or broadcasting.

NOTES:

_____