

PXQ524/PXQ540 Remote Interface

Also applies to **PXD520**



Protocol: RS-232/EIA-232

Firmware version: 1.00

For board revision: PCB15083: All

Standard on all units.

Revision 1.0

Created: October 17, 2007

Revised: February 22, 2008

Applies to products: PXQ540, PXQ524, PXD320 (firmware 1.00 and higher)

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Overview

The PXQ524/PXQ540 includes a standard RS232 serial interface for remote control of the unit. This document describes the operation and interface of that port. This allows the PXQ524/PXQ540 to be controlled by a computer, industrial controller or custom control device.

Physical Interface

The connections are made via a 3.5mm rear panel connector (an internal header connector is also available on the PC board). MicroImage Video Systems can provide standard cables to match standard serial ports. Customized cables are also available. The remote port specifications are:

Connection:	3.5mm Phone Jack (in addition to a 2mm Header Connector on the PC Board)
Physical Interface:	EIA232D (RS232)
Baud rate:	9600
Data bits:	8
Parity:	None
Stop bits:	1
Hardware Handshaking:	None
Protocol:	MicroImage PXQ Control Format Version 3 (MCL3-PXQ524-540)

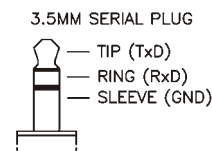
Connections

The PXQ524/PXQ540 uses a small 3.5mm stereo phone jack for the serial connection. The connections are shown to the lower right.

BL-PXQ524/BL-PXQ540 board level units all use a small 3 pin Hirose 2mm male connector for the serial connection. Some board level PXQ524/PXQ540 units may also have the 3.5mm phone jack as well. The Hirose 2mm pin connections are Pin 1 = Ground, Pin 2 = TxD and Pin 3 = Rx/D.

Data Transmission

This unit can receive a constant data stream from the host. Data is pipelined in such a way within the unit that the result may not be visible for up to 70 milliseconds after the last data byte in a command sequence has been received. Normally, this is not a problem since it still appears to happen immediately to the user. Response to queries may not start until up to 70mS after the request has finished. Queries are queued but may not always be transmitted in the order requests are made.



Command Structure

The command structure is composed of simple ASCII characters and is fairly easy to implement. It can also be tested with a standard ASCII terminal or emulation program. The command sequence consists of a Start character, Command

ID, Data byte(s) and a Stop character. The start and stop bytes are very important and should not be forgotten. Data is not processed internally until the stop character (] - ASCII \$5D hex) is received.

The command structure: [A####]

The basic structure for queries is just a slight bit different with addition of a question mark:

Query structure: [?A]

The start character is an open bracket ([- ASCII \$5B hex). Transmitting a “[“ character in the middle of any command sequence will cancel (reset) the previous sequence and start a new one. Transmitting a sequence of [] (open bracket, close bracket) will cancel any pending command.

The command ID can be any valid character from the list in the “commands” section of this document. It must follow the start character. In the PXQ524/PXQ540, only uppercase letters and some punctuation are used to initiate commands. If an invalid ID character is sent, the unit will respond with a question mark (? , ASCII \$3F hex) as an acknowledgment. This will be sent regardless of the setting of the acknowledge level set by the [A] command. The acknowledge level may add additional characters as well.

The data sequence can consist of 0 to 4 numeric digits and has a different meaning for each command. Data can be in decimal or hexadecimal format and the hex letters (A-F) may be in uppercase (A-F) or lowercase (a-f).

Leading zeros may be used ahead of the number. If a command requires the number 1, this may be entered as 1, 01, 001 or 0001 - all will be interpreted correctly. As an example, to set the unit to L/R split, you could enter:

[M1]
[M01]
[M001]
[M0001]

and all will produce the correct result. If more than four numbers are entered (i.e. M98760001]) the last four entered are used, (0001 in the recent example).

If the command is entered without the data argument (i.e. [M]), the data will be interpreted as 0000 (Zero). In this case, it would set the system to the Input A mode, the same as if the command [M0] would have been entered.

All characters in the data sequence are hexadecimal formatted (except for the position command [P], which is selectable to be decimal or hexadecimal formatted). Since none of the other commands (except P) used in the PXQ524/PXQ540 have more than nine functions, the data can be hexadecimal or decimal with the same results.

The stop byte consists of a closing bracket (] - ASCII \$5D hex). Upon reception of the stop character, the command is sent to a buffer which holds the full command until the proper process can parse and execute the command. This may take up to 70mS to complete after the reception of the stop byte. A second command can be started while the first one is executing but the stop byte for the second command should not be sent until the first one has completed.

Data Reception

Data is received in the unit by an interrupt routine but is not parsed until the entire string has been sent. The data is double buffered and the parsing occurs within a separate task. The acknowledgment codes (if used) are also generated by a separate task. Due to this multitasking within the unit, the programmed action may not occur for up to 70mS after the stop byte (]) is received. If the acknowledge command is set to send an acknowledgment, it will be sent after the command operation has completed.

Commands

A Acknowledge Level [A##] where # = 0 through 99 as defined below

[uppercase A]

Command Examples:

[A0] = Quiet mode. Only errors will be acknowledged with a “?” (Power on default).

[A1] = Simple Acknowledge - will return a semicolon (“;” ASCII \$3B hex) only, except when there is a command error, then it will only return a question mark (?).

[A2] = Command Acknowledge - will return the sent command character and the semicolon except when there is a command error, then it will only return question mark (?).

[A3] = Command and Data Acknowledge - will return the command character, four data characters and the semicolon terminator. Note that regardless of the number of data characters sent, four will always be returned. The leading characters will be all zeros if not used. The exception is when there is a command error, then only the question mark (?) Will be returned.

[A99] = Debug Mode - Will return all the data as in [A3] above plus add a carriage return (CR) and line feed (LF) (ASCII \$0D and \$0A hex respectfully). The CRLF WILL be appended to the command error acknowledge (?). Debug mode should NOT be used in system. It is designed only for testing and the format could change in the future.

B Border [B#] where # = 0 to 4

[uppercase B]

Command Examples:

[B0] = No Border (Disabled)

[B1] = Black Border

[B2] = Dark Gray Border

[B3] = Light Gray Border

[B4] = White Border

At power up, the last setting used is restored from EEPROM.

The indicator on the front panel will illuminate when this command is enabled, off when disabled.

Note that the border is only visible in the multi display modes like Dual and Quad. See the operation manual for additional information.

E Exchange [E#] where # = 0 or 1

[uppercase E]

Command Examples:

[E0] = Exchange disabled

[E1] = Exchange enabled

At power up, the last setting used is restored from EEPROM.

The indicator on the front panel will illuminate when this command is enabled.

The exchange command switches the order of the input signals in split mode. When this command is enabled [E1], the A input will be displayed on the right or bottom while input B is on the left or top of the screen. This operates the same as the exchange switch on the front panel. See the operation manual for additional information.

M Mode **[M#]** where # = 00 through FF (inclusive)
[uppercase M]

Command Examples: [M20] = Input A full screen display
[M21] = Input B full screen display
[M22] = Input C full screen display
[M23] = Input D full screen display
[M50] = Quad Display Mode
[M60] = Side-By-Side Mode inputs A & B
[M61] = Side-By-Side Mode inputs C & D
[MF8] = Internal Color Bar Generator (full field bars)

This command is set and queried in Hexadecimal (00-FFh)

Note, all mode commands are represented as implied hexadecimal. Not all numbers are implemented.

At power up, the last mode setting used is restored from EEPROM.

The indicators on the front panel will illuminate to indicate which mode is set.

The mode command operates the same as the mode command switches on the front panel. See the operators manual for additional information.

Note that other commands may be set but some may have odd effects on operation. It is advised the user only program the modes list above. Note that when non-implemented commands are programmed, the LEDs will not indicate any mode but the display may show the last used mode or a any other mode.

X System Settings **[X#]**
[uppercase X]

Command Examples: [X2] = Enables Front Panel switches (power up default)
[X3] = Disables Front Panel switches

The power up default settings for this command are noted above. This command is used to set system interface parameters. There will likely be additional functions added to this command in the future.

At power up, or after the X2 command is issued, functions can be controlled by both the remote port and by the front panel switches. They can be used concurrently. Setting function [X3] will disable the front panel switches allowing only remote control until power is cycled or the [X2] command is issued. The power switch will still function even when the front panel switches are disabled.

Query Commands

The user or computer system can ask the unit for information (data query). Virtually all settings can be transmitted from the unit. Below are the commands for queries.

! Test **!** (hex \$21, does not use brackets)
[exclamation point]

Command Example: ! (hex \$21) (single character, does not use brackets)

Returned Data: ! (hex \$21) (single character, returns same character)

When the unit receives the test character, it will return the same character to the sender within 70mS. This is a quick way to check communications with the unit and for a computer system to make sure the unit is booted and available.

# [number symbol]	ID # (does not use brackets)
Command Example:	# (hex \$23, single character, does not use brackets)
Returned Data:	when the unit receives the ID character, it will return a string of comma delimited data about the product. An example string would look similar to the following: [mPXQ540,v0100,l0100,d20071017.]
Other fields may also be present as well as needs dictate.	
Explanation of fields:	
m = Model Number field. v = firmware code version l = logic/DSP code version d = date of code base	

^ [caret]	Send All	^ (hex \$5E, single character, does not use brackets)
Command Example:	^ (hex \$5E, single character, does not use brackets)	
Returned Data:	when the unit receives the Send All character (^), it will return a string of data that is the same as issuing most query commands: [A##][E#][H#][M#][X#] Please see the individual query commands for the exact formats and options associated with each.	

This command is the same as issuing all of the following commands: [?A][?E][?H][?M][?X].

The Send All command is an easy way to query the unit for it's current settings, such as on power up so a remote system can synchronize with it.

Note: In the future, more commands are likely to be added to this sequence.

Note: Commands may not always be sent in the same order or sequence. Decode the commands based on the start character and the following command letter, never by the byte position in the sequence.

?A [uppercase ?A]	Query Acknowledge Level	[?A]
Command Example:	[?A]	
Returned Data:	[A##]	
where # = 00 through FFh (see Acknowledge Level command for above for details)		

?B [uppercase ?E]	Query Border	[?B]
Command Example:	[?B]	
Returned Data:	[B0] = No Border (Disabled) [B1] = Black Border	

[B2] = Dark Gray Border
[B3] = Light Gray Border
[B4] = White Border

At power up, the last setting used is restored from EEPROM.

This command will display changes made via the BORDER switch on the front panel or via the serial B command. The BORDER indicator on the front panel will also indicate the state of this setting - illuminated when enabled.

?E Query Exchange [?E]
[uppercase ?E]

Command Example: [?E]

Returned Data: [E0] = Exchange disabled
 [E1] = Exchange enabled

At power up, the last setting used is restored from EEPROM.

This command will display changes made via the EXCH switch on the front panel or via the serial E command. The EXCH indicator on the front panel will also indicate the state of this setting - illuminated when on.

When the E command is enabled [E1], the A input will be displayed on the right or bottom while input B is on the left or top of the screen. See the operation manual for additional information.

?M Query Mode [?M]
[uppercase ?M]

Command Example: [?M]

Returns Data: [M20] = Input A full screen display
 [M21] = Input B full screen display
 [M22] = Input C full screen display
 [M23] = Input D full screen display
 [M50] = Quad Display Mode, A in upper left, D in lower right.
 [M60] = Side-By-Side Mode A-B
 [M61] = Side-By-Side Mode C-D
 [MF8] = Color Bar Generator Mode

This command is set and queried in Hexadecimal (00-FFh)

At power up, the last setting used is restored from EEPROM.

The indicators on the front panel will illuminate to also indicate which mode is set.

The command returns the current mode as set by the front panel switches or via the remote mode command.

Note that other commands may be set but some may have odd effects on operation. It is advised the user only program the modes list above. Note that when non-implemented commands are programmed, the LEDs will not indicate any mode but the display may show the last used mode or a any other mode.

?X Query System Settings [?X]
[uppercase ?X]

Command Example: [?X]

Returned Data: [X--0-] = Front Panel switches enabled (power up default)
 [X--1-] = Front Panel switches disabled

This command returns four characters of data after the X. The first two (left most) characters are undefined and can be 0 or 1. The third data character indicates if the front panel is enabled or not and the fourth data character represents the position control source. The dash (-) indicates another character that is not relevant to the item listed.

The power up default settings for this command are noted above.

This returns the system interface parameters. There may be additional functions added to this command in the future.

At power up, or after the X2 command is issued, functions can be controlled by both the remote port and by the front panel switches. They can be used concurrently. Setting function [X3] will disable the front panel switches allowing only remote control until power is cycled or the [X2] command is issued. Even when the switches are disabled, the power switch will continue to function.

Changes

In the future, there will likely be additions to this command structure. We will strive to keep all new functions backward compatible to minimize any problems. Do not send any commands that are not currently implemented, as this could cause future incompatibilities.

The latest version of this document will be on the MicroImage Video Systems web site at www.mivs.com. Look in the Technical (Support)/Manuals section or at the PXQ524/540 page(s).

Assistance

If you have any questions regarding this document or product, please call:

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