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Prepared By	Ivan Potter	Prepared For	iLED PTY LTD
Description	Using the eZi-HDMI-MX001 with RS232		

eZi...the way it should be

RS232 for eZi-HDMI-MX001

iLED (PTY) Ltd
Tel: +27 11 958 2529
Fax: +27 11 958 2591
Email:info@iled.co.za

41 Willow Brook Office Park
BLOCK C Van Hoof Street
Ruimsig

Roodepoort
P.O. Box 3221
Wilropark
1731

Introduction

This document details my experience with iLed eZi HDMI 4x4 Matrix Switcher when implementing an RS232 interface to a control device.

As additional reading, there are numerous on line resources that can be been used as reference material. The resource list has been added for your convenience.

Extracts may have been used from some of these resources to compile this document

HDMI Organisaton	http://www.hdmi.org
Wikipedia	http://en.wikipedia.org/wiki/High-bandwidth_Digital_Content_Protection
Lammertbies	http://www.lammertbies.nl/comm/cable/RS-232.html

Glossary

RS232	Recommended Standard 232
DTE	Data Terminal Equipment
DCE	Data Communication Equipment
ASCII	American Standard code for Information Interchange

Contents

RS232 Introduction

For additional reference on RS232 , ASCII , HEX and RS232 cabling , refer to
http://iled.co.za/Insight-docs/SpeakercraftRS232Rev1-1-100609.pdf

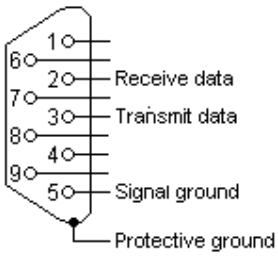
The eZi-HDMI-MX001 uses RS232 communications as one of the options to control the Input to Output switching. A matrix switcher can have any of 4 inputs switched to any of 4 Outputs. The simplest form of control is via the Infra Red port – this is implemented by learning the remote control commands using the remote control provided and then duplicating these infra red commands in the control system to provide the required switching. The Infra Red details are not covered in this document.

RS232

A DB9 Female is supplied at the back of the eZi-HDMI-MX001.

RS232 Pinouts – DB9Female

DB9 Female Pinouts



To connect the eZi-HDMI-MX001 to a USB to 232 converter, simply plug the convertor DB9 Male in.

Rule of Thumb for cables –

- For control systems where the plug is a DB9 Male
  - make up a DB9 Male to Female cable connecting pin2 to 2, pin 3 to 3, pin 5 to 5. An example of this is the connection of a PC on board RS232 connector to the eZi-HDMI-MX001.

- For control systems where the plug is a DB9 Female,
  - make up a DB9 Male to Male cable connecting pin2 to 3, pin 3 to 2, pin 5 to 5.

RS232 Communication Parameters

- Baud Rate – 9600
- Data Bits – 8
- Parity – None
- Stop Bits – 1
- Handshake – None

Recommended Testing Method

To ensure that the device responds as expected, connect using HyperTerminal (Refer to HyperTerminal operations below) and try some of the commands below. This will ensure that you understand the command set BEFORE you start coding.

After this, prepare the RS232 commands in your control system and connect the control system to your PC – once again using HyperTerminal. Ensure the cable Pin Outs are correct between the control system and PC serial port. Send out serial commands from the control system and use HyperTerminal to verify that the string sent is as expected.

RS232 Protocol Description

The protocol is a 3 byte ASCII packet with NO end of line terminator. The lack of an end of line terminator (don't shoot the messenger) means that if corrupt communications is experienced, the input buffer will wait until the next string and strip the required 1 or 2 bytes to complete the packet. The lack of a communications timeout in the eZi-HDMI-MX001 means that you have to clear the buffer if there is data corruption. This is quite simple and is explained below.

The data packet consists of a lower case ASCII "a" (inverted commas are not part of the command but shown for clarity) followed by 2 ASCII command characters. The "a" is referred to as a header. The command string can therefore be explained as a single ASCII header followed by 2 ASCII command bytes.

If you have tested the unit and the communications is working using HyperTerminal, please follow the steps below to gain an understanding of what happens when data corruption or an incomplete string occurs. The import fact to note is that the eZi-HDMI-MX001 appears to lock up. This is not the case, with a bit of coding, the buffer can be cleared and the communications will resume. The instructions are referenced to HyperTerminal. Use the front buttons to select Output1-4 to Input1 – this is simply to ensure the status string shown below is what will appear in your HyperTerminal screen .

1. Type in a99 – DO NOT PRESS ENTER KEY
2. Reply is S13S23S33S43
3. Type a99 and press the enter key
4. Reply is S13S23S33S43
5. By pressing the Enter Key, a single ASCII character (Hex0D or Carriage Return CR) has been sent. This character now sits as the first character in the 3 string command.
6. Press a99
7. You will see no reply. The leftover CR from step 5 is in position 1, the "a" character has filled position 2 and the 9 has filled position 3 of the 3 characters expected in the command. The command that the eZi-HDMI-MX001 is trying to process is CR-a-9. This is not a valid command and is discarded without a reply. The second 9 of the a99 command is now occupying position 1 of the next command.
8. The system appears to be locked up.
9. To clear the problem when no reply is given after a command, simply press CR then CR then your command.
10. If no reply is received, do this again. The buffer will clear and communications will continue. The reason for having to possibly type CR CR <command> once or twice is you are unsure if there are 1 or 2 characters in the buffer that require clearing.

RS232 Troubleshooting

When a 3 ASCII Character string is sent and understood by the eZi-HDMI-MX001, a reply as per the command table below will be transmitted from the eZi-HDMI-MX001. If no reply is received, there could b 3 possible causes

1. eZi-HDMI-MX001 is not powered up
2. RS232 cable pinouts incorrect
3. Communication Parameters need to be checked
4. RS232 Data Corruption. Power unit off and try again.
5. Ensure the command strings are followed EXACTLY as shown – capitals and lower case are VERY IMPORTANT.

RS232 Command Set

Switching Commands

	Input 1	Input 2	Input 3	Input 4	Next Input	Previous Input
Output1	a09	a1D	a1F	a0D	a41	a57
Output2	a17	a12	a59	a08	a11	a1B
Output3	a5E	a06	a05	a03	a48	a55
Output4	a18	a44	a0F	a51	a40	a07

Note 1 all 0 are number Zero and NOT capital O.

Note 2 All alphabet characters EXCEPT Header “a” are CAPITAL

Switching Command Reply

	Input 1	Input 2	Input 3	Input 4	Next Input	Previous Input
Output1	S13	S12	S11	S10	Input Number. Identified as shown to the left of this column	
Output2	S23	S22	S21	S20		
Output3	S33	S32	S31	S30		
Output4	S43	S42	S41	S40		

Status Command

a99

Status Reply - Output Channel 1 to 4 are switched to input as per table below

Status Reply Format - SaaSbbSccSdd

	Input 1	Input 2	Input 3	Input 4
Output1 (input identified by aa)	13	12	S11	10
Output2 (input identified by bb)	23	22	S21	20
Output3 (input identified by cc)	33	32	S31	30
Output4 (input identified by dd)	43	42	S41	40

Running HyperTerminal to verify eZi-HDMI-MX001 Communications

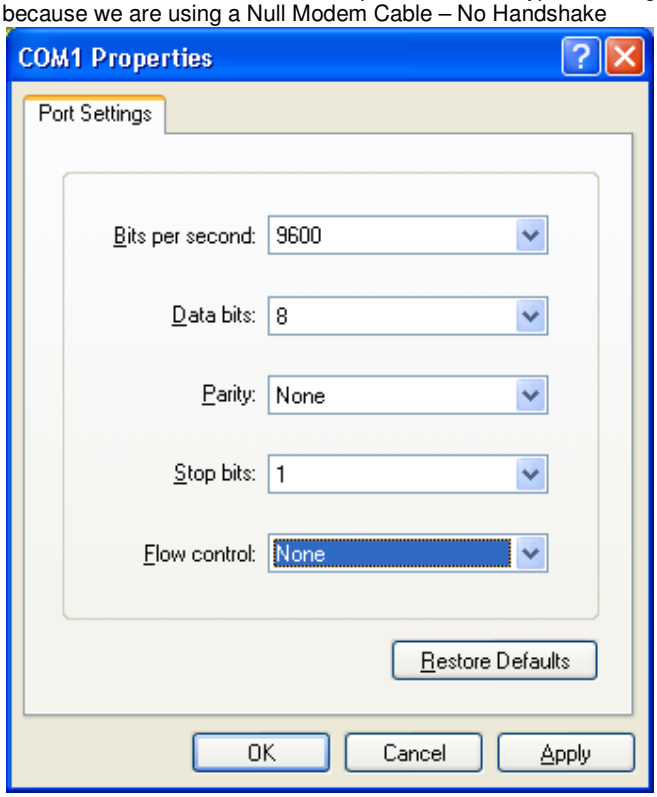
Run HyperTerminal – From Windows Start Menu. Select All Programs – Accessories – Communications – HyperTerminal

Type in the Name – Example - CommsTester

Select OK

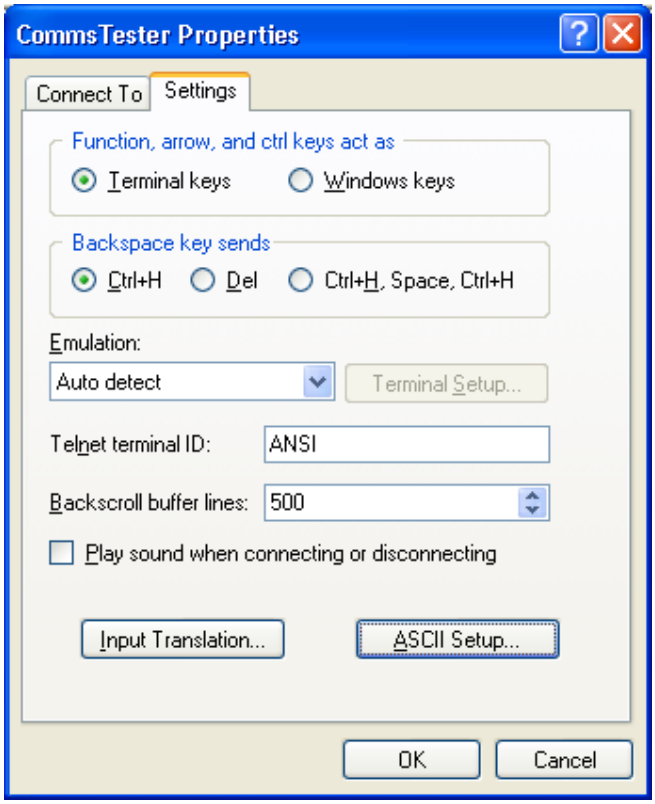
Select the Communications Port from the drop down box

Select the communication interface parameters – A typical setting is shown. Please note the handshake is set to None because we are using a Null Modem Cable – No Handshake



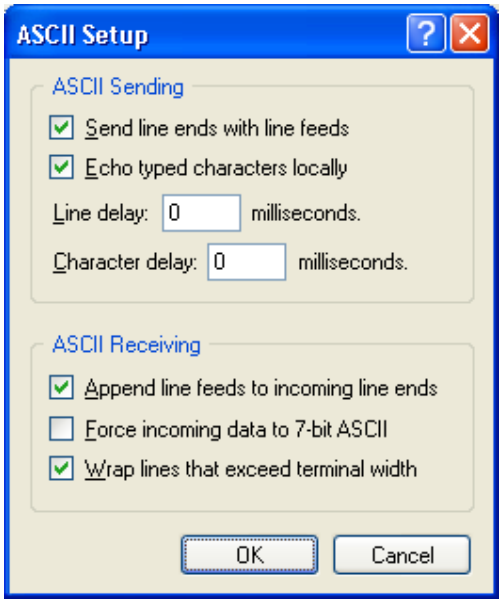
Select OK

To ensure that a line feed is appended to a carriage return, Select File - Properties from the menu. Select the Settings Tab



Select ASCII Setup

Tick Send Line ends with Line Feeds
Tick Echo Typed Characters Locally
Tick append Line Feeds to incoming Line Ends



Select OK and then OK again to return to HyperTerminal main screen

The main screen will display whatever communications are received and as you type, the ASCII value will be transmitted. If the screen has characters that make no sense, verify that the communication parameters (excluding handshake) are correct.

Screen Dump of HyperTerminal Examples