AVS-HDB-4TX

BLACK BOX®

Video Extender - 4K HDMI, IR, RS-232, 4-Port Transmitter

User Manual

Distributes one HDMI input to four HDBT outputs, plus one local HDBT output.

Contact Information

Order toll-free in the U.S. or for FREE 24/7 technical support: Call 877-877-BBOX (outside U.S. call 724-746-5500)
www.blackbox.com • info@blackbox.com

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FEDERAL COMMUNICATIONS COMMISSION AND INDUSTRY CANADA RADIO FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

Normas Oficiales Mexicanas (NOM) Electrical Safety Statement INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.

4. Todas las instrucciones de operación y uso deben ser seguidas.

5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..

6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.

7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.

8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.

9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.

10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.

11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:

A: El cable de poder o el contacto ha sido dañado; u

B: Objectos han caído o líquido ha sido derramado dentro del aparato; o

C: El aparato ha sido expuesto a la lluvia; o

D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o

E: El aparato ha sido tirado o su cubierta ha sido dañada.

Safety Precautions

For best results, read all instructions carefully before using the transmitter. Save this manual for further reference.

- Unpack the equipment carefully and save the original box and packing material for possible future shipment.
- Follow basic safety precautions to reduce the risk of fire, electrical shock, and injury to persons.
- Do not dismantle the housing or modify the module. This may cause electrical shock or burn.
- Using supplies or parts that do not meet the products' specifications may cause damage, deterioration, or malfunction.
- Refer all servicing to qualified service personnel.
- To prevent a fire or shock hazard, do not expose the unit to rain, moisture, or install this product near water.
- Do not put any heavy items on the extension cable.
- Do not open or remove the housing of the device. This might expose you to dangerous voltage or other hazards.
- Install the device in a place with proper ventilation to avoid damage caused by overheating.
- Keep the module away from liquids.
- Spillage into the housing may cause fire, electrical shock, or equipment damage. If an object or liquid falls or spills on to the housing, unplug the module immediately.
- Do not twist or pull the ends of the optical cable. This can cause the device to malfunction.
- Do not use liquid or aerosol cleaners to clean this unit. Always unplug the power to the device before cleaning.
- Unplug the power cord when the device is unused for a long period of time.
- Disposal information: do not burn or mix the device with general household waste, treat it as electrical waste.

NOTES:

1. PoC is short for Power over Cable.

2. The AVS-HDB-4TX transmitter works only with the AVS-HDB-RX receiver.

3. The item "far-end" means the device (e.g. display device, third-party RS-232 device etc.) connected to the AVS-HDB-RX.

Table of Contents

1. Specifications

Video	
Video Input/Output	VESA and SMPTE 480p to 2160p (4K) @30 Hz
Audio	
Audio Input/Output	All HDMI audio formats including Dolby D (TrueHD)/ DTS (HD-Master Audio)/ PCM; Channel count: from 2-8 (2.0 to 7.1); Sample rates: 32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz, 176.4 kHz and 192 kHz
HDBaseT	
Distance	224 feet (70 m) with HDMI video, RS-232 and IR control, PoC supports AVS-HDB-RX
Control Signals	
RS-232 and IR	Full function passthrough
RS-232	Port ID selectable for cascading
Power	
Power Supply	24-VDC, 2.71 A
Physical	
Enclosure	Aluminum chassis
Dimensions	0.9"H x 5.8"W x 1.7"D (2.2 x 14.8 x 4.4 cm) (half rack wide)
Weight	Product: 1.32 lb. (0.60 kg); Shipping: 3.67 lb. (1.67 kg)

2. Overview

2.1 Introduction

The Video Extender - 4K HDMI, IR, RS-232, 4-Port Transmitter distributes one HDMI input to four HDBaseT outputs, plus one HDMI local output. You can use the HDMI output socket to monitor local devices or cascade with an additional transmitter.

The AVS-HDB-4TX transmits uncompressed 4K (max) HDMI, IR, and RS-232 signals over a single CAT5e/6/7 cable. It supports transmission of a 4K signal up to 128 feet (40 meters) and 1080p signal up to 224 feet (70 meters). If required, use the HDMI local output to cascade the HDMI signal up to 4 times with additional AVS-HDB-4TX. AVS-HDB-4TX is also capable of bi-directional IR control, RS-232 control, EDID management, and PoC.

AVS-HDB-RX recievers are recommended to use the full function of the HDB outputs of this device.

2.2 Features

- Complies with HDMI 1.4 and 3D standards.
- Transmits 4K x 2K @30 Hz signals up to 128 feet (40 meters) and 1080p signals up to 224 feet (70 m).
- Supports PoC.
- Supports bi-directional IR control and cascade control.
- Supports RS-232 control and cascade control.
- Provides real-time display of working status via LED indicators.
- Supports EDID configuration, 5 types in total.
- Supports cascading via HDMI OUT, IR Loop, and RS-232 Loop.

2.3 What's Included

Your package should include the following items. If anything is missing or damaged, contact Black Box Technical Support at 877-877-2269 or info@blackbox.com.

- (1) Video Extender - 4K HDMI, IR, RS-232, 4-Port Transmitter (AVS-HDB-4TX)
- (2) mounting ears

- (8) screws
- (1) 3.5-mm male-male audio cable (used for IR signal cascading)
- (1) RS-232 cable (3-pin captive connector to DB9)
- (1) RS-232 cable (connect two 3-pin captive connectors for cascading)
- (4) plastic cushions
- (1) power cord
- (1) 24-VDC, 2.71-A power adapter

To download this user manual from our Web site:

1. Go to www.blackbox.com
2. Enter the part number (AVS-HDB-4TX) in the search box:
3. Click on the "Resources" tab on the product page, and select the document you wish to download.

If you have any trouble accessing the Black Box site to download the manual, you can contact our Technical Support at 877-877-2269 or info@blackbox.com.

2.4 Hardware Description

Figure 2-1 shows the front panel of the Video Extender - 4K HDMI, IR, RS-232, 4-Port Transmitter (AVS-HDB-4TX). Table 2-1 describes its components.

Figure 2-1. Front panel.

Table 2-1. Front-panel components.

Number in Figure 2-1	Component	Description
1	Power LED	Lights red when powered on.
2	USB port	Used for firmware update.
3	Input	Lights green when there is an input signal. Remains off when there is no input signal.
4	Outputs	HDMI: • Lights green when the HDMI source signal is HDCP. • Blinks green when the HDMI source signal is without HDCP. • Off when there is no input HDMI signal; LINK: • Indicates linking of each of the four HDBaseT sockets. • Lights green when the corresponding HDBaseT socket is connected to the AVS-HDB-RX. • Off when there is no AVS-HDB-RX connected to the corresponding socket. HDCP: • Indicates HDCP compliance of the receivers connected to the four HDBaseT ports. • Lights green when the corresponding receiver is with HDCP. • Blinks green when the corresponding receiver is without HDCP. • Off when there is no receiver connected to the cor responding port.

Figure 2-2 shows the back panel of the transmitter. Table 2-2 describes its components.

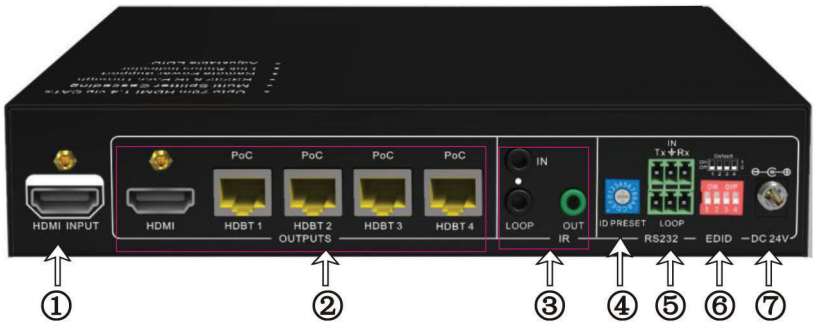

Figure 2-2. Back panel.

Table 2-2. Back panel components.

Number in Figure 2-2	Component	Description
1	HDMI Input	Connects to an HDMI source device such as DVD/Blu-ray™.
2	Outputs	HDMI: • Connects to an HDMI display or cascades the HDMI AV signal to other displays. HDBaseT: • The four HDBaseT output ports connect to IR receivers to transmit the HDMI signal.
3	IR	IN: • Connects to IR receiver to receive an IR signal from an IR emitter. LOOP: • Cascades the IR control signal to another HDBaseT splitter by connection to its IR IN socket. OUT: • Connects to an IR emitter to emit the IR signal received from the receiver side.

Table 2-2. Back panel components.

Number in Figure 2-2	Component	Description
4	ID PRESET	• Assign ID for AVS-HDB-4TX to identify every unit. The value can range from 0–F. • After you assign the ID, restart the AVS-HDB-4TX for stable performance.
5	RS-232	IN: Connect with a control device through a 3-pin captive cable. LOOP: Cascade the RS-232 control signal to another transmitter by connecting to its RS-232 IN port. *NOTE: Be sure to set the communication protocol parameters correctly, and send RS-232 commands as described in Section 4.2.3, RS-232 Communication Commands.*
6	EDID DIP switches	4-pin EDID DIP switches: "1" stands for ON, "0" stands for OFF. Set the switches to change EDID data as described in Section 4.3, EDID Management.
7	24-VDC power socket	Plug the included 24-VDC power adapter into this socket and tighten the screw.

3. System Connection

3.1 Usage Precautions

1. Install the system in a clean environment that has a proper temperature and humidity.
2. Make sure that all the power switches, plugs, sockets, and power cords are insulated and safe.
3. Connect all devices before powering on.

3.2 System Diagram

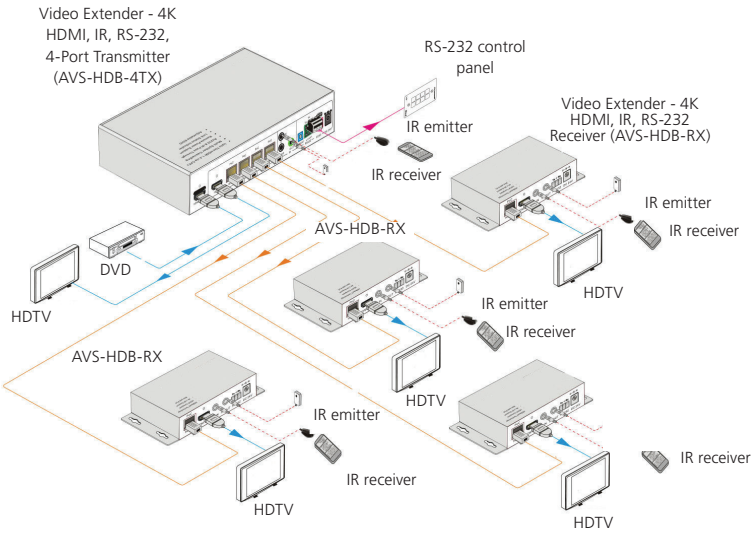

Figure 3-1. Typical application.

3.3 Connection Procedure

Step 1. Connect an HDMI source device (for example, a Blu-ray™ DVD) to the HDMI INPUT socket of the AVS-HDB-4TX with HDMI cable.

Step 2. Connect an HDMI display to HDMI OUTPUT socket of the AVS-HDB-4TX with an HDMI cable.

Step 3. Connect the AVS-HDB-RX(s) to the HDB output port(s) of the AVS-HDB-4TX with twisted-pair cable.

Step 4. Connect a control device (for example, a PC) to the RS-232 IN port of the AVS-HDB-4TX or the AVS-HDB-RX (bi-directional RS232 control, either end is available).

To cascade an RS-232 signal among several AVS-HDB-4TX transmitters through an RS-232 LOOP, connect the RS-232 LOOP socket to one transmitter and the RS-232 IN socket of the next transmitter until all AVS-HDB-4TX transmitters are connected.

Step 5. Connect an IR Receiver to the IR IN port, and an IR Emitter to the IR OUT port. The IR signal can be transmitted bi-directionally between a AVS-HDB-4TX transmitter and the AVS-HDB-RX(s) receiver(s).

To cascade an IR signal among several AVS-HDB-4TX, connect the IR LOOP socket of one of them and the IR IN socket of the next until all AVS-HDB-4TX transmitters are are connected.

Step 6. Connect the included 24-VDC power adapter to the power port of the AVS-HDB-4TX. The AVS-HDB-RX can be powered by the AVS-HDB-4TX via PoC.

3.4 Cascade Connection

3.4.1 Cascade AV Signal

An HDMI source signal can be cascaded to several displays via HDMI OUT/ IN.

Connect the HDMI OUT socket of the first AVS-HDB-4TX transmitter to the HDMI IN socket of the next transmitter until all AVS-HDB-4TX transmitters are connected.

HDMI signals delivered within the first AVS-HDB-4TX can be output to other connected AVS-HDB-4TX transmitters.

3.4.2 Cascade Control Signal

AVS-HDB-4TX supports control cascading via IR LOOP/ RS-232 LOOP to enable signal loop output. Choose one or multiple cascade methods according to your needs.

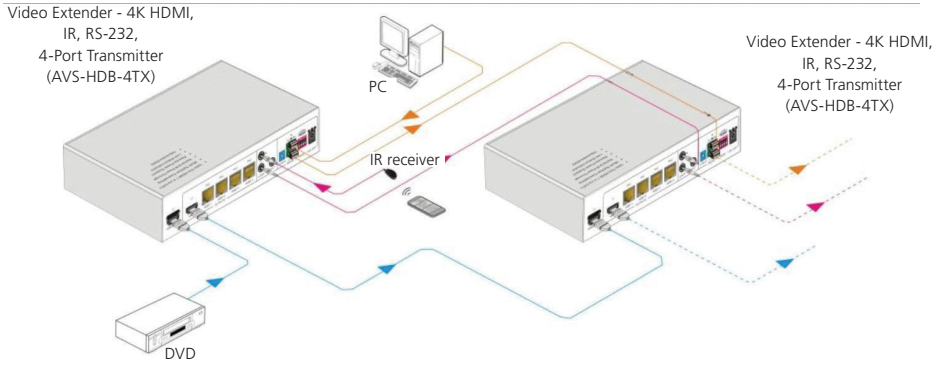

Figure 3-2. Cascade connection.

Cascade through IR Loop

Connect the IR LOOP socket of the first AVS-HDB-4TX and the IR IN socket of the next until all AVS-HDB-4TX transmitters are connected.

Sending IR signals to the IR Receiver connected to the first AVS-HDB-4TX will control all cascaded AVS-HDB-4TX transmitters.

Cascade through RS-232 Loop

Connect the RS-232 LOOP socket of the first AVS-HDB-4TX and the RS-232 IN socket of the next until all AVS-HDB-4TX
transmitters are connected.

Sending RS-232 commands will control all cascaded AVS-HDB-4TX transmitters synchronously.

NOTE: To identify the cascaded AVS-HDB-4TX transmitters, set a unique ID for each unit.

3.5 Twisted Pair Cable Connection

The twisted-pair used in AVS-HDB-RX MUST be a straight-through cable. The connectors can be T568A or T568B, but both sides must be the same.

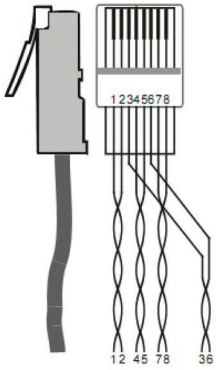

Figure 2-18. Cable pinout diagram.

NOTE: Cable connectors must be metal, and the shielded layer must be connected to the connector's metal shell to ground the cable.

Table 2-6. TIA pinouts.

TIA/EIA 568A connector pinout.		TIA/EIA 568B connector pinout.	
Pin	Cable Color	Pin	Cable Color
1	Green/White	1	Orange/White
2	Green	2	Orange
3	Orange/White	3	Green/White
4	Blue	4	Blue
5	Blue/White	5	Blue/White
6	Orange	6	Green
7	Brown/White	7	Brown/White
8	Brown	8	Brown
1st Ground	4–5	1st Ground	4–5
2nd Ground	3–6	2nd Ground	1–2
3rd Group	1–2	3rd Group	3–6
4th Group	7–8	4th Group	7–8

4. Control Modes

Use the AVS-HDB-4TX for various applications, including computer monitoring, conference rooms, big screen displays, televisions, command and control centers, and smart homes, etc.

You can control the AVS-HDB-4TX via IR, RS-232 commands, and EDID management.

4.1 IR Control

The AVS-HDB-4TX has an IR IN port that supports bi-directional transmission. Connect an IR receiver to the IR IN port, and users can control the AVS-HDB-4TX/far-end device locally or control local devices remotely via the corresponding IR remote.

4.1.1 Control the Far-End Device Locally

Control the AVS-HDB-4TX or far-end display device locally through the corresponding IR remote.

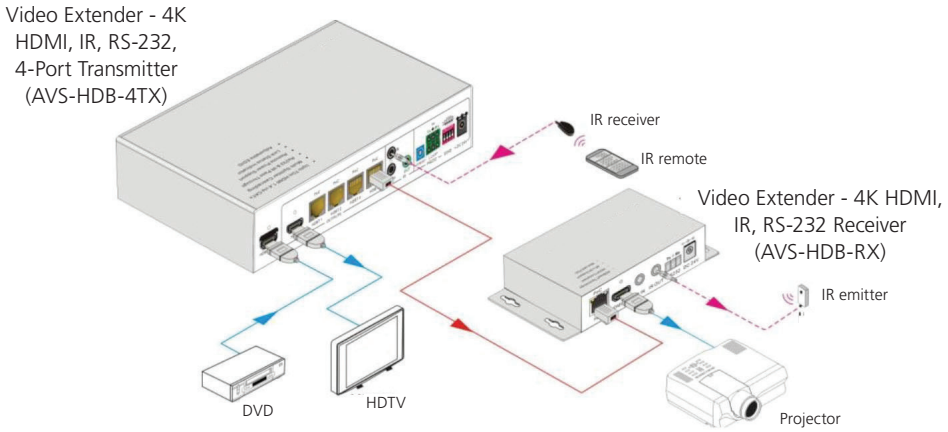

Figure 4-1. Control a far-end device locally.

4.1.2 Control the Local Device Remotely

Control the AVS-HDB-4TX or local display remotely via the corresponding IR remote.

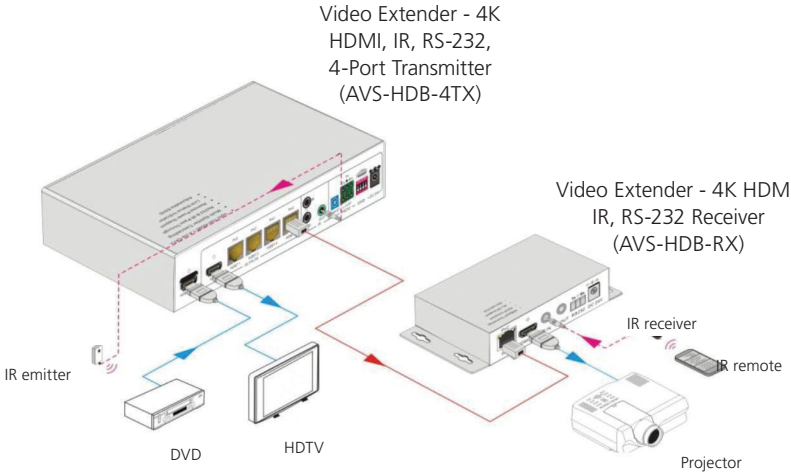

Figure 4-2. Control a local device remotely.

4.2 RS-232 Control

Connect the RS-232 ports of the AVS-HDB-4TX and AVS-HDB-RX. AVS-HDB-4TX can control the third-party (RS-232 device) connected to the AVS-HDB-RX locally.

NOTE: The AVS-HDB-4TX can only control third-party devices with designated baud rates, including 2400, 4800, 9600, 19200, 38400, 57600, and 115200.

4.2.1 Accessing through Serial

1. Using the client, select “serial” and enter “9600” for the speed (baud rate).

2. No username or password is required. Just press enter.

Set the COM number, baud rate, data bit, stop bit, and parity bit correctly so you can send commands in the Command Sending Area of the screen.

NOTE: To control the AVS-HDB-4TX via an RS-232 port, configure the communication protocol parameters as: Baud rate: 9600; Data bit: 8; Stop bit: 1; Parity bit: none.

4.2.2 RS-232 Communication Commands

Table 4-1. RS-232 communication commands.

Command	Function	Feedback Example
EDIDUpgrade[x][y].	Upgrade EDID data via the serial port; [X]: unit ID, ranges from 00–15; [Y]: serial number of embedded EDID, ranges from 0–4 (corresponds to embedded EDID 1–5). Connect and power on the input source before sending this command.	WAIT FOR EDID FILE
[X][Y] [Q1],[Q2]$[Z]	Send commands to several HDB outputs port synchronously. [X]: unit ID, ranges from 00–15; [Y]: serial number of third party's baud rate, ranges from 1–7; [Q]: serial number of the HDB output port, ranges from 1–4; [Z]: command to be sent.	
OFF[X][Y1] , [Y2],[Y3].	Switch off several outputs of a transmitter; [X]: unit ID, ranges from 00–15; [Y]: serial number of the output port, the value ranges from 1–5 (1 corresponds to the HDMI output port, 2–5 correspond to HDB OUT 1–4.)	OFF Y1, Y2, Y3 Y=1–5
OFF[X][0].	Switch off all the outputs of a transmitter; [X]: unit ID, varies from 00–15.	OFF All

Command	Function	Feedback Example
ON[X][Y1],[Y2],[Y3].	Switch on several outputs of a transmitter; [X]: unit ID, varies from 00–15; [Y]: serial number of output port, the value can be 1–5 (1 corresponds to the HDMI output port, 2~5 correspond to HDB OUT 1–4 separately.)	On Y1, Y2, Y3 Y=1–5
ON[X][0].	Switch on all outputs of a transmitter; [X]: unit ID, ranges from 00–15.	On All

NOTES:

1. *In the above commands, "["and "]" are symbols for easy reading and do not need to be typed in actual operation.*
2. *Type in the complete commands including the ending symbol ".".*
3. *When the unit ID is changed, reboot the unit before sending commands.*
4. *To control a third-party device via RS-232 commands, type in the correct serial number for the device's baud rate in the command. The table on the next page shows a list of the baud rates and their serial numbers.*

Table 4-2. Baud rates and serial numbers.

Baud Rate	Serial Number
2400	1
4800	2
9600	3
19200	4
38400	5
57600	6
115200	7

4.3 EDID Management

The AVS-HDB-4TX has a 4-pin EDID DIP switch. "1" stands for "On", "0" stands for "Off". Set the switches to change the EDID information.

Table 4-3. EDID information.

Transmitter Status	EDID Information
0001	1080P 2D
0010	1080P 3D
0011	720P 2D
0100	720P 3D
0101	DVI 1920 x 1080

In factory default status (Status: 0000), the AVS-HDB-4TX passes the signals through directly; input and output devices process the signal automatically.

You can update EDID data via the serial port. Send command EDIDUpgrade[x][y]. to upgrade the 5 embedded EDID data separately.

5. Troubleshooting and Maintenance

Table 5-1. Problems/Causes/Solutions.

Problem	Cause	Solution
Losing color or no video signal output in HDMI display.	The cables may not be connected correctly or may be broken.	Check whether the cables are connected correctly and are in working condition.
No HDMI signal output in AVS-HDB-4TX while local HDMI input is in normal working state.		
Cannot control AVS-HDB-4TX by control device (e.g. a PC) through the RS-232 port.	Wrong RS-232 communication parameters.	Make sure the RS-232 communication parameters are correct.
	AVS-HDB-4TX is broken.	Contact Black Box Technical Support at 877-877-2269 or info@blackbox.com.
Static becomes stronger when connecting the video connectors.	Bad grounding.	Check the grounding and make sure it is connected correctly.

If your problem persists after you follow the above troubleshooting steps, contact Black Box Technical Support at 877-877-2269 or info@blackbox.com.

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