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## Introduction

## **WELCOME**

Thank you for choosing the AdderView DDX system. This adaptive system makes sharing numerous host computers among multiple users straightforward and flexible. Every computer is linked, via its USB and video ports, to a compact DDX-CAM module while each set of peripherals are connected to a DDX-USR module (to form Consoles).

The various computers and consoles are then linked, via **CAT6a** or **CAT7** cable with **S/FTP**, **S/STP** or **PiMF** shielding (see <u>Appendix 1</u> for details), to a central DDX switch. Each user can then, subject to the privileges granted by the admin, gain quick access to any of the required computers.



An integral part of DDX switches is the DDX Matrix, a browser-based configuration and management tool that allows one or more remote admin user(s) to monitor and maintain all aspects of operation.

If required, computers and consoles can be individually connected in order to take advantage of the DDX extender properties without the switching.



50m maximum



## **Cable type and distance rules**

Note: Do not use unshielded

cables with the DDX modules.

- Cable screening/shielding is required. The best cable shielding specifications for use with the DDX system are: S/FTP, S/STP or PiMF.
- Extension distances up to 50m are supported with single uninterrupted runs of recommended cable (shielded CAT6a or CAT7 cable).
- CAT5 or CAT5e cables must not be used with this product.
- Overall cable runs must be reduced by 5m for each additional cable coupling.
- All patch cables should be as short as possible and should be no longer than 2m.
- It is recommended that Adder shielded CAT7 cables are used for maximum performance.

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## **Access permissions**

The DDX switch uses a system of hierarchal Access permissions to mediate between numerous consoles and multiple computers. Each console is granted the use of up to four types of access permissions to each computer, most of which influence how other users can gain simultaneous access to the same computer. The four access permissions, and their effects on other console users are as follows:



## **Port designations**

By default the DDX switch provides 10 user console ports on its front panel and 20 computer ports along its rear panel, however, these designations are not fixed. If your installation requires a greater number of computers or has a need for more user consoles, you can alter the allocation of these standard ports to suit:



÷.

30

USER

20

сомр

OR

USER





Four self-adhesive rubber feet Safety document



19" rack mount brackets and four screws **DDX-USR** package

## **DDX-CAM** DisplayPort option





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## **OPTIONAL EXTRAS**



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## Installation

## LOCATIONS

Please consider the following important points when planning the position of the AdderView DDX modules:

- If used, position the DDX switch in a central position that serves the host computer systems and user modules without exceeding the maximum link lengths. It will also require a source of mains power.
- Situate each DDX-USR module close to the peripherals to which it will be connected and near to a source of mains power.
- Consult the precautions listed within the <u>Safety information</u> section.



## CONNECTIONS

Connections do not need to be carried out in the order given within this guide, however, where possible connect the *power in* as a final step. Connections are split into the following three areas:

- **Computer connections** a DDX-CAM module links to each host computer.
- **Switch connections** when used, a DDX switch unit sits at the heart of the system.
- Console connections the peripherals (keyboard, display, etc.) connect to DDX-USR modules.

## Computer connections: Video

Two types of DDX-CAM modules are available:

- DVI-D and USB,
  - or
- DisplayPort and USB.

If a computer has more than one video output, use additional DDX-CAM modules to separately link the additional video stream(s) with other ports on the DDX switch.

OR

DisplayPort on the host computer

## To connect the video port

I Connect the video lead of the DDX-CAM to the DVI-D or DisplayPort video port of the host computer.



Each DDX-CAM module requires a single USB connection to the computer. This provides essential power for the DDX-CAM module in addition to the USB signals. Each DDX-USR module acts as a USB 2.0 hub and thus provides four sockets for peripherals.

## To connect the USB port

I Connect the USB cable of the DDX-CAM module to a vacant USB socket on your host computer.



## Computer connections: Data link

Each DDX-CAM module is linked via a shielded (S/FTP or S/STP) CAT6a or CAT7 cable either to a central DDX switch module or directly to a DDX-USR module (for a single system installation).

Maximum link cable lengths:

**DVD-D** video

host computer

port on the

- DDX-CAM to DDX switch 10 metres (32 feet) maximum.
- DDX-CAM to DDX-USR module 50 metres (164 feet) maximum.

## To link the DDX-CAM module

I Connect the RJ-45 plug of the link cable to the socket located at the end of the DDX-CAM module.



DisplayPort video lead from the DDX-CAM

DVI-D video lead from the DDX-CAM



## Switch connections: Computer links

The host computer links are made to the sockets on the rear panel of the DDX switch.

## To connect a computer link

I Connect a shielded (S/FTP or S/STP) CAT6a or CAT7 cable (10m maximum) from the remote DDX-CAM computer module to a vacant RJ-45 socket on the rear panel of the DDX switch.

> These are NOT Ethernet/network ports and must NEVER be connected to any networking equipment.



Shielded CAT6a or CAT7 link from a remote DDX-CAM computer module

Note: Do not use unshielded cables with the DDX modules.

## **Reallocating ports**

By default the DDX switch provides 20 computer ports along its rear panel and 10 user ports along its front panel. If necessary, these standard arrangements can be changed. See **Reallocating ports**.

## Switch connections: User console links

The user console links are made via the sockets at the front of the DDX switch.



## Switch connections: **Network link**

Switch connections: **Options port** 

The options port is reserved for future use.



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To connect a network link

I Connect the CATx cable from an Ethernet switch or from a local computer.



or nearby computer

**OPERATION** 

## Switch connections: Power

Each DDX switch is supplied with a single power adapter but offers the facility to use a second input in order to provide operational redundancy. The DDX unit can operate perfectly well from a single power adapter operating alone. When two adapters are connected, the unit will spread its load between them; should one power input fail, 100% of the load will be transferred to the other power adapter without a break in operation. Remote checking of the power inputs is possible at any time via the browser interface see <u>Maintenance > Diagnostics</u> for details.

There is no on/off switch on the DDX unit, so operation begins as soon as power is applied at either port.

## To connect the power adapter

1 Attach the output plug of the supplied power adapter to either power input socket on the left side of the rear panel.

## To disconnect the power adapter

I Isolate the power adapter from the mains supply.

Note: If you are replacing one of dual power adapters during operation, it is not necessary to also remove power from the other adapter.

- 2 Grasp the outer body of the power adapter plug where it connects with the module.
- 3 Gently pull the body of the outer plug away from the module. As the body of the plug slides back, it will release from the socket and you can fully withdraw the whole plug.



Gently pull back the plug outer body to release the lock

**IMPORTANT:** Please read and adhere to the electrical safety information given within the <u>Safety information</u> section of this guide. In particular, do not use an unearthed power socket or extension cable.

Note: Both the modules and the power supplies generate heat when in operation and will become warm to the touch. Do not enclose them or place them in locations where air cannot circulate to cool the equipment. Do not operate the equipment in ambient temperatures exceeding 40 degrees Centigrade. Do not place the products in contact with equipment whose surface temperature exceeds 40 degrees Centigrade.



2 Connect the IEC connector of the supplied country-specific power cord to the socket of the power adapter.



3 Connect the power cord to a nearby main supply socket.

4 Where power redundancy is required, repeat steps I to 3 for a second power adapter.

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## Console connections: Video

A Single Link DVI-D port is provided on the rear panel of the user module.

The DDX-USR module supports one video display with pixel clocks up to 165MHz (equivalent to a maximum resolution of 1920 x 1200 at 60Hz - aka 'WUXGA').

If a second display is required to support a dual video installation, use another DDX-USR module to drive the second display, and combine the two user modules into a single Console within the DDX Matrix configuration application - See Configure > Computers.

## To connect the video display

I Connect the DVI-D video cable from your video display to the video output port on the rear panel of the user module.

# From your video display

## **EDID** management

The DDX switch provides a number of fixed EDID (Extended Display Identification Data) profiles that will suit a large number of video display configurations. If additional EDID definitions are required for your installation, you can clone new definitions from connected video displays and add these to the list of available definitions.

For details about cloning EDIDs from displays, see Add EDID.

For details about applying an EDID to a particular computer, see Configure > Computers > Transmitters.

## **DDX-USR** module switches

The two switches on the DDX-USR module are reserved for future use and must both remain in the OFF position.

## Console connections: USB



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The DDX-USR module contains a USB hub that can support up to four v1.1 or v2.0 USB

devices (in any combination). All four USB sockets, two on the front panel and two on the rear, are identical in operation.

Note: In multi-head installations, the USB devices must be attached only to the DDX-USR module that drives the main display.

## To connect USB devices

I Connect your USB keyboard and mouse to any of the four sockets distributed on the front and rear panels of the user module.





## Console connections: Audio

The DDX-USR module supports stereo speakers, headphones and also a microphone port. All audio devices are presented at the linked host computer as USB audio devices.

Note: In multi-head installations, the audio devices must be attached only to the DDX-USR module that drives the main display.

## To connect your speakers

1 Connect your speakers to the audio line out socket on the user module rear panel.



To connect your headphones/microphone

- I Connect your headphones to the socket labeled  $\widehat{}_{IIII}$  on the user module front panel.
- 2 Connect your microphone to the socket labeled  $\P$  on the user module front panel.

## Console connections: Data link

Each DDX-USR module is linked via shielded (S/FTP or S/STP) CAT6a or CAT7 cable either to a central DDX switch module or directly to a DDX-CAM module (for a single system installation) - do not exceed 50 metres (164 feet).

## To link the DDX-USR module

Console connections: **Options port** The options port is reserved for future use.

I Connect a shielded (S/FTP or S/STP) CAT6a or CAT7 cable to the LINK socket on the rear panel of the DDX-USR module. Connect the other end of the cable to either a DDX switch or directly to a DDX-CAM computer module.



This is NOT an Ethernet/network port and must NEVER be connected to any networking equipment.



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## Console connections: **Power**

There is no on/off switch on the DDX-USR module, so operation begins as soon as power is applied. The supplied power adapter uses a locking-type plug to help prevent accidental disconnections; please follow the instructions given right whenever disconnecting a power adapter.

## To connect the power adapter

1 Attach the output plug of the supplied power adapter to the power input socket on the rear panel of the DDX-USR module.



## To disconnect the power adapter

I Isolate the power adapter from the mains supply.

- 2 Grasp the outer body of the power adapter plug where it connects with the module.
- 3 Gently pull the body of the outer plug away from the module. As the body of the plug slides back, it will release from the socket and you can fully withdraw the whole plug.



Gently pull back the plug outer body to release the lock

2 Connect the IEC connector of the supplied country-specific power cord to the socket of the power adapter.



3 Connect the power cord to a nearby main supply socket.

**IMPORTANT:** Please read and adhere to the electrical safety information given within the <u>Safety information</u> section of this guide. In particular, do not use an unearthed power socket or extension cable.

Note: Both the modules and the power supplies generate heat when in operation and will become warm to the touch. Do not enclose them or place them in locations where air cannot circulate to cool the equipment. Do not operate the equipment in ambient temperatures exceeding 40 degrees Centigrade. Do not place the products in contact with equipment whose surface temperature exceeds 40 degrees Centigrade.



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## **ACCESSING DDX MATRIX**

DDX switches are configured via their network connections using an intuitive browserbased application, called **DDX Matrix**. This secure, password protected application is accessible by any authorized user, located anywhere.

## To access DDX Matrix

- I Use a computer that is directly or indirectly (i.e. via a network switch) connected to the DDX switch. If you need to make a temporary connection, see right  $\bigcirc$
- 2 Run a web browser on your computer and enter the IP address of the DDX switch. The DDX switch uses the Universal Plug and Play (UPnP) protocol to attempt contact with a valid DHCP server to determine a suitable IP address. If a DHCP server cannot be located then the switch will automatically fall back to a link-local IP address (in the range 169.254.1.0 thru 169.254.254.255).

Whichever method the switch uses, the initial IP address can be discovered either:

- Using the Windows network browser (of a computer connected to the same sub network or directly to the switch), or
- In the lower right corner of the OSD screen (of a console connected to one of the user ports) see <u>Viewing the OSD</u>.

Note: For security, DDX Matrix uses HTTPS by default with a self-signed certificate - Please ignore any warnings that may be displayed by your web browser.

3 If requested, enter your username and password to log on.

Note: The default username and password are **admin** and **password** respectively. The opening page of the DDX Matrix should be displayed:

# Login Cashecone Control Contro





## The Dashboard page

Once you have successfully logged in, DDX Matrix will show the dashboard page to provide a general overview of your DDX installation. You can also re-display this page by clicking the Dashboard entry in the menu:





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## Quick guide to creating a new installation

When creating a new DDX installation there are various configuration tasks that need to be completed within DDX Matrix. This page provides a recommended 'to do list' of the stages that you need to perform.

## **Primary tasks**

- Configure the networking details for the DDX switch
- Ensure that the EDID definitions are appropriate for your installation If additional EDID definitions are required for your installation, you can clone new definitions from connected video displays and add these to the list of available definitions
- Add the required consoles (either before or after they are connected) By default the DDX switch provides 20 computer ports along its rear panel and 10 user ports along its front panel. If necessary, these standard arrangements can be changed to suit your installation.
- Determine the access permissions for each console
- Add your computers (either before or after they are connected)
- Add the users and define their login details

## Secondary tasks

- Optionally make changes to the OSD settings
- Add description and location details for the switch

See <u>Configure > Central Switch > Network</u> See <u>Configure > Central Switch > Manage EDIDs</u>

See <u>Add EDID</u> See <u>Configure > Consoles</u>

See <u>Reallocating ports</u> See <u>Access permissions</u> See <u>Configure > Computers</u> See <u>The Users Page</u>

See <u>Configure > Central Switch > OSD Settings</u> See <u>Configure > Central Switch > General</u>

## The Control page

The Control page provides a Connection map that allows the admin user to view and affect how consoles are connected to the various computers. This page is particularly useful when managing video-only installations.



## To connect a console

I Click the down arrow on the console entry to reveal the list of computers that it is authorized to access.



- 2 Click the appropriate connection icon adjacent to the required computer:
  - View only console user can view a computer's output but not alter it,
  - Shared access console user can view and control a computer along with other consoles,
  - Exclusive multiple console users can view a computer but only one can control it,

## or

• **O Private** - console user can view and control the computer privately while other users are locked out.

For further details, see Access permissions.

3 You can change the connection method at any time by clicking the down arrow again and choosing an alternative connection option.

## To disconnect a console

I Click the 💋 button in the lower left corner of the console entry that you wish to disconnect.



## The Configure pages

The **Configure** menu option expands when clicked to reveal three sub-sections:

- Central Switch settings related directly to the DDX switch.
- <u>Consoles</u> settings related to the DDX-USR modules and their connected peripherals.
- Computers settings related to the DDX-CAM modules and their host computers.



## Central Switch > General

Basic descriptive settings for the DDX switch. These are most useful when multiple DDX installations are being managed; labelling each installation as you go is a good habit to get into:

- Description a further opportunity to add more information about the switch.
- Location a useful feature if you have multiple DDX switches distributed around.
- System Default EDID determines the default EDID to use for the installation.
- Ignore Firmware Mismatch when set to On, this overrides the checks that are made to ensure all modules are running compatible firmware versions. This override should be used in exceptional circumstances only.
- Firmware Version shows the firmware version of the DDX switch.
- Recovery Version shows the version of the DDX switch recovery image.
- Admin UI Version shows the version of the DDX Matrix admin user interface.

🕒 Log out 😽	My Account ( <b>Administrator</b> )
Configure 🕻	×
Central Swi	tch / Network
DHCP	ON
IP Address	192.168.42.90
Net Mask	255.255.255.0
Gateway	192.168.42.1
Mac Address	00:0F:58:02:BC:54
HTTP Server	OFF 3
Network Service Discovery	Enabled
	Update

## Central Switch > **Network**

All of the key settings for the network capabilities of the DDX switch are here:

- DHCP allows you to use DHCP (Dynamic Host Configuration Protocol) to automatically determine all network settings or set them manually. When set to On, the next three options are not editable.
- IP Address set the IP address for the switch.
- Net Mask set a subnet mask to accompany the IP address.
- Gateway optionally define a suitable address for a gateway device.
- $\ensuremath{\textit{MAC}\xspace{Address}}$  displays the unique (and fixed) MAC address for the switch.
- *HTTP Server* when ON, switches to the use of insecure HTTP for web admin switch reboot required. **IMPORTANT: Do not enable this option when the switch is connected to external networks.**
- Network Service Discovery when set to Disabled, the switch will not announce its presence on the network and will not be discoverable using the Windows network browser on a network-connected computer.

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## Central Switch > **OSD Settings**

Options related to the on screen display are presented in this section:

- *Thumbnails* when set to Off, this option will hide the thumbnail views of each computer within each user's OSD main page.
- Auto Layout when set to Off, this option will maintain a 5x5 grid for the displayed computers within the OSD main page, regardless of the number of available computers. When set to On, the OSD view grid will be re-scaled accordingly.
- Display System Info when set to On, the current IP address and firmware version details for the DDX switch will be shown in the lower right corner of the OSD.

🕩 Log out 🛛 🛱 My Accou	unt ( <b>Ac</b>	dministrator)	
Configure 📽			
Central Switch /	Mar	nage EDIDs	i 🖸 🗗
EDID	TYPE	ORIGINATING PORT	ACTIVE TRANSMITTER PORTS
DDX-101 - 1920x1080 HD1080 @ 60Hz	Fixed		System
DDX-102 - GENERIC 4:3 @ 60Hz	Fixed		
DDX-103 - GENERIC 16:10 @ 60Hz	Fixed		
DDX-104 - GENERIC 16:9 @ 60Hz	Fixed		
DDX-105 - GENERIC LOW @ 60Hz	Fixed		
DDX-106 - 640x480 VGA @ 60Hz	Fixed		



**\$** My Account (**Administrator**)

## Central Switch > Manage EDIDs

This page lists the EDID (Extended Display Identification Data) profiles that are currently available:

- EDID shows the resolutions and refresh rates for all profiles that are currently stored.
- Type indicates where each EDID profile originated: Fixed EDIDs are included within the switch firmware and cannot be removed. User EDIDs are those that have been cloned from particular video displays attached to DDX-USR modules these can be deleted if required. On the main <u>Central Switch</u>
   <u>General</u> page you can select the 'Default System EDID' from the list of fixed and user EDIDs.
- Originating Port indicates which switch port supplied each user EDID.
- Active Transmitter Ports indicates which transmitters (if any) are currently using each EDID.

Note: The DDX switch will modify the EDID, if a Dual link monitor is connected, to list only the video resolutions that it is capable of supporting.

## Add EDID

Log out

If additional EDID definitions are required for your installation, you can clone new definitions from connected video displays and add these to the list of available definitions.

Click the [+] icon to begin collecting a new EDID from a display attached (via a DDX-USR module) to one of the switch ports.

Click the EDID dropdown list and choose the appropriate receiver (DDX-USR module) from which you wish to clone a new EDID profile. Then click the Add EDID button.

For details about applying an EDID to a particular computer, see <u>Configure > Computers ></u> <u>Transmitters</u>.

## **Configure > Consoles**

A *Console* is a collective term for a set of peripheral devices arranged around one or more DDX-USR modules. This page lists all registered consoles:

🗭 Log out 🛛 🎝 My Account (Administrator)

Сс	onfigure 🗱						
Cc	onsoles		Click a he ascendin to the er	ading to reorder the w g or descending order ntries within the chose	vhole list in according n column.	÷	0-
NAME	DESCRIPTION	<u>PORTS</u>	OSD MOUSE LAUNCH	CONNECTED COMPUTER	CURRENT ACCESS MODE	S	
Console 01	Console on Port 21	[21]	On				
Console 02	Console on Port 22	[22]	On				
Console 03	Console on Port 23	[23]	On				0-
Console 04	Console on Port 24	[24]	On				
Console 05	Console on Port 25	[25]	On				
Console 06	Console on Port 26	[26]	On				
Console 07	Console on Port 27	[27]	On				
					Delete :	Selected	

In addition to the *Name* and *Description*, other columns provide the following details and options for each console entry:

• *Ports* - each DDX-USR module connects to a single port on the DDX switch. This column lists the port(s) used by the DDX-USR module(s) associated with each console. Two or more DDX-USR modules can be combined to form multi-head consoles, each connecting to separate ports.

Note: For consoles with multiple displays (multi-head), additional user console ports are required. If there are no spare user console ports available then any unused computer ports on the rear panel can be deleted in order to free them up as spares. See <u>Reallocating ports</u>.

- OSD Mouse Launch when set to On, allows the console user to invoke the on Screen Display by holding down their center mouse button and then clicking the right button.
- Connected Computer shows to which computer the console is currently connected.
- Current Access Mode indicates how the console is currently connected to the listed computer: 
   = View only, <</li>
   = Shared access, 
   = Exclusive, 
   = Private
- *Tick box* Allows you to tick all required console entries and then remove them collectively using the Delete Selected button.

Edit ←

Click an entry to view/edit its details. See <u>Configure > Consoles > Edit an entry</u>



## Add new

Click the [+] icon to begin adding a new console, either before or after connecting the DDX-USR module(s):

- Name the main identifier for the new console.
- Description a further opportunity to add more information.
- OSD Mouse Launch (see description left).
- *Port* add the port number (located on the main DDX switch) used by the DDX-USR module associated with this console. For multi-head consoles, ensure that the port used by the primary DDX-USR module (the one that has the primary display and peripherals attached) is the first one to be defined. If a chosen port is already used, a warning will be displayed, see <u>Reallocating ports</u>.
- Add Console click to save your settings.

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## Configure > Consoles > Edit an entry

Click on an entry within the Configure > Consoles list to display this page. Here you can edit the configuration details for a chosen console.

ADDERVIEW	Log out Age My Account (Administrator)
	Configure 📽
□ DASHBOARD     ↔ CONTROL	<u>Consoles</u> / Console 01
CONFIGURE	Name Console 01
CENTRAL SWITCH	Description Console on Port 21
NETWORK	OSD Mouse Launch ON
OSD SETTINGS	Dest. Drimsen Hand Bert 24 - surrenthuis une his General V
MANAGE EDIDS	Port - Primary Head
RECEIVERS	
COMPUTERS	Access Permissions Computer 01 🔽 🔿 <table-cell-columns> 🙆 🔿 \star</table-cell-columns>
TRANSMITTERS	
👻 USERS	Computer 04         Image: Compute



## Edit

- Name the main identifier for the console.
- *Description* a further opportunity to add more information about the console.
- OSD Mouse Launch when set to On, allows the console user to invoke the on Screen Display by holding down their center mouse button and then clicking the right button.
- Ports shows the user port number(s) (located on the main DDX switch) used by the DDX-USR module(s) associated with this console. For multi-head consoles, ensure that the port used by the primary DDX-USR module (the one that has the primary display and peripherals attached) is the first one to be defined. If a chosen port is already used, a warning will be displayed, see <u>Reallocating ports</u>.
- Access Permissions choose which computers this console is permitted to access. For each computer choose one or more of the four icons to set the access permissions:
  - View only console user can view a computer's output but not alter it,
  - Shared access console user can view and control a computer along with other consoles,
  - **Exclusive** multiple console users can view a computer but only one can control it,

or

• O Private - console user can view and control the computer privately while other users are locked out.

For further details, see Access permissions.

When you have made your changes, click the Update button at the foot of the page.

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## **Configure > Consoles > Receivers**

At the heart of each console (the collective term for a set of peripherals connected to the DDX system) is a receiver called a DDX-USR module.

ADDERVIEW	🗭 Log out 🛛 🛱 My Account ( <b>Administrator</b> )						
	Configure 🗱						
□ DASHBOARD ↔ CONTROL	R	eceivers	Click a he ascendin to the e	eading to reorde g or descending ntries within the	r the whole list in order according chosen column.		
	PORT NO	CONSOLE NAME	<u>FIRMWARE</u>	MONITOR NO	MONITOR MODEL		
CENTRAL SWITCH	21	Console 01	1.02.4075		KVM-via-IP	0	
NETWORK	22	Console 02					
OSD SETTINGS	23	Console 03					
MANAGE EDIDS	24	Console 04					
	25	Console 05					
CONSOLES		Console 06					
RECEIVERS	27	Console 07					

This page shows various details for each DDX-USR module:

- Firmware the current internal software version for each DDX-USR module.
- *Monitor No* an index number for each video display. The first monitor for any console will be indexed as '1'. Where a console has more than one video display associated with it (by using additional DDX-USR modules), this column will show '2', '3', etc. against the secondary, tertiary, etc. DDX-USR module(s).
- *Monitor model* indicates the video display model as reported to the DDX-USR module to which it is connected.
- Unique ID (shown only when the Maintenance > Settings > Web UI Mode is set to Advanced) this column displays the unique identifier hardwired into every DDX-USR module.



Click a receiver entry to view the configuration details of the

Within this page it is possible to reboot and/or recover a receiver.

This option (shown only when the Maintenance > Settings > Web

UI Mode is set to Advanced) is used to reprogram a receiver that

has failed during a firmware upgrade. Once the Recover Receiver

button is clicked, you will be asked to power cycle the respective receiver, whereupon it will boot up into recovery mode. Then you will asked to click a Reprogram button to commence the

DDX switch port to which it is connected.

**Recovering a receiver** 

operation.

**INSTALLATION** 

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## **Configure > Computers**

This page lists the computer systems that are connected to the DDX switch unit via individual DDX-CAM modules:

➡ Log out S My Account (Administrator)

	Configure	<b>0</b> °						
	Computer	-S	C ;	lick a headir ascending or to the entrie	ng to reorder the descending orde es within the chos	whole list in r according en column.		÷
NUMBER	NAME	DESCRIPTION	<u>PORTS</u>	THUMBNAIL	PRIMARY CONSOLE	CONNECTED CONSOLES	CURRENT ACCESS MODE	
	Computer 01	Computer description	[1]	×				
	Computer 02	Computer description	[2]	¥				<b>0</b>
	Computer 03	Computer description	[3]	<b>~</b>				
	Computer 04	Computer description	[4]	<b>~</b>				
	Computer 05	Computer description	[5]	¥				
	Computer 06	Computer description	[6]	<b>~</b>				
	Computer 07	Computer description	[7]	✓				
19	Computer 19	Computer description	[19]	<b>~</b>	2			
	Computer 20	Computer description	[20]	<b>~</b>				
							Delete S	elected

In addition to the *Name* and *Description*, the columns also provide the following useful details for each computer entry:

- Port(s) each DDX-CAM module connects to a single port on the DDX switch. This column lists the port(s) used by the DDX-CAM module(s) associated with each computer. Two or more DDX-CAM modules can be combined to support extra displays (multi-head), each connecting to a separate port. Three of the user console ports (21 to 23) can be changed into computer ports, if there are fewer user consoles within your installation. See <u>Reallocating ports</u>.
- *Thumbnail* indicates whether a thumbnail image of the computer's video output will be shown on the OSD screen for each user. If disabled (unticked), a black image will be shown in the OSD screen.
- Primary Console indicates the console that currently has control of the computer.
- Connected Consoles lists all consoles to which each computer is attached.
- Current Access Mode indicates how the computer is currently being accessed by the listed console:
   View only, < = Shared access, a = Exclusive, a = Private</li>
- *Tick box* Allows you to tick all required computer entries and then remove them collectively using the Delete Selected button.



## Add new

Click the [+] icon to begin adding a new computer, either before or after connecting the DDX-CAM module(s):

OPERATION

FURTHER INFORMATION

- *Name* the main identifier for the new computer.
- Description a further opportunity to add more information about the computer.
- Computer Number provides a list of the remaining vacant computer numbers that you can associate with your new entry. The chosen number will determine the position of this computer in the OSD screen and also the hotkey (Ctrl+Alt+n) used to access it. You can swap the number used with other computers within the <u>edit page</u>.
- *Ports* Add one or more port numbers used by the DDX-CAM module(s) associated with this computer.

## Edit

Click an entry to view/edit its details and options. See <u>Configure > Computers > Edit an entry</u> **INSTALLATION** 

CONFIGURATION

INDEX

## Configure > Computers > Edit an entry

This page allows you to edit the configuration details for a chosen computer.

ADDERVIEW	🗭 Log out	📽 My Account ( <b>Administrator</b> )
	Configu	ire 📽
□ DASHBOARD     ↔ CONTROL	Compu	<u>ters</u> / Computer 02
	Name	Computer 02
CENTRAL SWITCH	Description	Computer description
NETWORK	Computer Number	Number: 2 - currently assigned to: Computer 02 🔽 🕄
OSD SETTINGS		
MANAGE EDIDS	Port - Primary Head	Port: 2 - currently in use by: Computer 02
CONSOLES		•
RECEIVERS	Thumbnail	Enabled
COMPUTERS	Primary Console	
TRANSMITTERS	Connected Consoles	Console 01
🐸 USERS	Current Access	•
🔎 MAINTENANCE	Mode	
		Update Delete
	Transm	litters
	PORT NO	FIRMWARE MONITOR NO

## Edit

- Name the main identifier for the computer.
- Description a further opportunity to add more information about the computer.
- Computer Number displays a list of computer numbers (used and vacant) that you can associate with this entry. The chosen number will determine the position of this computer in the OSD screen and also the hotkey (Ctrl+Alt+n) used to access it. If you choose a computer number that is already used by another computer, then it and the existing number held by this computer will be swapped over.
- *Port(s)* shows the one or more port numbers used by the DDX-CAM module(s) associated with this computer. For multi-head computers, ensure that the port used by the primary DDX-CAM module (the one linked to the primary video output) is the first one in the list. Three of the user console ports (21 to 23) can be changed into computer ports, if there are fewer user consoles within your installation. See <u>Reallocating ports</u>.
- *Thumbnail* indicates whether or not a thumbnail view of this computer's video output should be shown OSD screen for each user.
- *Primary Console* indicates the primary console that is connected to this computer.
- Connected Consoles indicates other consoles that are also connected to this computer.
- *Current Access Mode* indicates the access mode (e.g. View Only, Shared, Exclusive, etc.) that is currently being used for this computer.
- *Transmitters* lists the transmitters (DDX-CAM modules) that are serving this computer.

When you have made your changes, click the Update button.

## Configure > Computers > Transmitters

This page lists various details for each DDX-CAM module:

module.

module(s).

into every DDX-CAM module.

• Computer Name - the given name for each connected computer.

• Firmware - the current internal software version for each DDX-CAM

• Monitor No - an index number for each video display port. The first port for

video display connected it (by using additional DDX-CAM modules), this

• Unique ID - (shown only when the Maintenance > Settings > Web UI Mode

is set to Advanced) this column displays the unique identifier hardwired

any computer will be indexed as '1'. Where a computer has more than one

column will show '2', '3', etc. against the secondary, tertiary, etc. DDX-CAM

Each computer connects to a DDX-CAM transmitter module. This page lists each DDX-CAM module and their key details:



Click a transmitter entry to view the configuration details of its port on the DDX switch. Within this page it is possible to reboot and/or recover a transmitter.

**Reboot Transmitter** 

## Applying a different EDID

If a computer needs to use an EDID profile that differs from the one being used as the default *System EDID*, use these steps:

- I If necessary, clone the required EDID see <u>Add EDID</u>.
- 2 View the Configure > Computers > Transmitters page and click on the required computer entry (to show the page above).
- 3 Select the appropriate entry from the *EDID* drop down list.
- 4 Click the Update button.

## Recovering a transmitter

A My Account (Administrator)

Transmitters / Computer 01 / Port 1

System Default EDID ( DDX-101 - 1920x1080 HD1080 @ 60Hz )

€ Log out

Configure 📽

Firmware 1.01.4022

Unique ID

Monitor No

EDID

Transmitter Operations

FFBF000568204BAF

This option (shown only when the Maintenance > Settings > Web UI Mode is set to Advanced) is used to reprogram a transmitter that has failed during a firmware upgrade. Once the Recover Transmitter button is clicked, you will be asked to power cycle the respective transmitter, whereupon it will boot up into recovery mode. Then you will asked to click a Reprogram button to commence the operation.

**Recover Transmitter** 

## INSTALLATION

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## **Reallocating ports**

By default the DDX switch provides 10 user console ports on its front panel and 20 computer ports along its rear panel, however, these designations are not fixed. If your installation requires a greater number of computers or has a need for more user consoles, you can alter the allocation of these standard ports to suit:

- Any of the 20 rear panel computer ports can be reallocated as user console ports, or
- Three of the front panel ports (labeled 21 to 23) can be used as computer ports.

## To reallocate a port that is already being used

1 While creating (or editing) a <u>computer</u> or <u>console</u> entry, choose the required port.

If the port is already being used, when you click the Update button, you will be presented with a warning such as the following:

Confirm Action	×
You have selected ports that are currently allocated to other computers/consoles. If you continue <b>ALL ports</b> for the following computers/consoles will be deallocated: • Console 03 (Ports: 23)	
Confirm Cancel	1

2 Click the Confirm button. The chosen port will first be de-allocated from its existing relationship and then paired to your device. The device that originally used the port will be left without a port allocation and will need separate attention.

Note: If you reallocate any port from a multi-head computer/console this will cause all ports associated with that computer/consoles to be de-allocated.



## The Users page

This page lists all registered users and allows the admin user to add, edit and delete entries, as required.

Note: When changes are made to user details, you are recommended to make a backup file.





The Maintenance pages The Maintenance section contains three pages: Diagnostics, System Operations and Settings.

## **Maintenance > Diagnostics**

This page provides important feedback on power inputs (and switch Temperatures). The temperature information is displayed only when the Maintenance > Settings > Web UI Mode is set to Advanced.

ADDERVIEW	🕪 Log out 🛛 🐗 My Account	(Administrator)		
	Maintenance 🞤			
Dashboard	Diagnostics			• This section indicates the status of the mains power input(s).
CONTROL	Supply	Temperature		
	Supply A Supply OK	CPU core	55 ° C	
USERS	Supply B No Supply	Case	27 ° C	
MAINTENANCE			42 ° C	These items are only shown when
DIAGNOSTICS		X-Point (Red)	42 ° C	Settings > Advanced Mode On is chosen
SYSTEM OPERATIONS		X-Point (Blue)	38 ° C	This section indicates the current temperature readings within the DDX
SETTINGS		X-Point (Green)	35 ° C	switch for the following:
	Ports			<ul> <li>The processor core,</li> <li>The internal case area,</li> <li>The main circuit board</li> </ul>
	NUMBER TYPE UPTIME		<u>STATUS</u>	• The red, green and blue video switch
	1 transmitter 0 days, 20 hou	rs, 4 minutes, 41 seconds	Operational	
	21 receiver 0 days, 20 hou	rs, 4 minutes, 42 seconds	Operational	

This section lists the currently active ports, their uptime and status.

## Maintenance > System Operations

This page provides a selection of important system operations that may be required at various times.



## ADDER

**Recovering an unresponsive** 

or receiver has failed, the unit may

become unresponsive. If so, please follow the advice provided in other

If a firmware upgrade to a transmitter

transmitter or receiver

sections of this guide:

• <u>Recovering a transmitter</u>

<u>Recovering a receiver</u>

## Upgrade Firmware

Upgrades the firmwares of the DDX switch and all connected modules to the latest version. Confirmation is required once this button is clicked.

### Sync Tx/Rx Firmware

Upgrades the firmwares of all connected modules to match that of the main switch. Confirmation is required once this button is clicked.

Note: Be sure that the DDX switch has the latest firmware installed before using this option.

### Reboot System

Performs a complete reboot of the entire DDX system, including the switch and all modules. Confirmation is required once this button is clicked.

### **Backup**

Saves a copy of the DDX Matrix system configuration to a file. Backup files are stored on the computer viewing DDX Matrix.

### Restore

Restores the DDX Matrix system configuration from a backup file. A file dialog will be displayed to allow you to choose the filename and location.

### **Factory Reset**

Returns all DDX system configuration settings back to their factory defaults.

## Maintenance > Settings

This page provides options related to the user interface. When you make a change, you need to click the Update button to save it.



## Web UI Mode

When this option is set to Advanced, extra details are shown on certain pages, such as:

- Configure > Central Switch > General
- Configure > Consoles > Receivers
- Configure > Computers > Transmitters
- Maintenance > Diagnostics

## Auto Refresh

When this option is set to On, the Dashboard, Control and Diagnostic pages will automatically update their contents every few seconds.

## Update

Click this button to save and enact any changes made to options.

## **RESETTING AND RECOVERING**

There may be rare occasions when the main switch or a module needs to be given a hard reset. The DDX switch and DDX-USR module both have concealed reset buttons for this purpose. You need to use a narrow implement (e.g. a straightened-out paper clip) to press-and-hold the recessed reset button on the front panel:



## DDX switch > Boot into recovery image

This procedure may be necessary if an attempted firmware upgrade has failed. The switch will load the factory default configuration, requiring you to log-in using the factory default username/ password and a freshly determined IP address (see <u>Accessing DDX</u>. <u>Matrix</u>). You will be required to accept a new temporary SSL certificate when accessing the web interface. *Note: All configuration data* (e.g. users, consoles, computers, networking, etc.) will be retained.

- I Press-and-hold the recessed reset button for **ten seconds** until the **STS** (*Status*) indicator begins to flash slowly.
- 2 Release the reset button. The **STS** indicator will go out and the switch will boot itself using the recovery image. The **STS** indicator will now begin to flash again to indicate that it is running from the recovery image (a red banner will also be shown at the top of the DDX Matrix screen).
- 3 When you are sure of operating conditions, such as having good power stability, proceed once again with the firmware upgrade.

## DDX switch > **Reset**

This procedure may be necessary if the switch has become unresponsive. Note: All configuration data (e.g. users, consoles, computers, networking, etc.) will be retained.

I Press-and-release the recessed reset button. The switch will reboot.

## DDX-USR module



## DDX-USR module > **Boot into recovery mode**

This procedure may be necessary if an attempted firmware upgrade has failed. For such a situation the DDX-USR module always retains a *recovery image* that will return the unit to a working condition, prior to reattempting a firmware upgrade.

- I Press-and-hold the recessed reset button for **ten seconds** until the **PWR** indicator begins to flash quickly.
- 2 Release the reset button.
- 3 When you are sure of operating conditions, such as having good power stability, proceed once again with the firmware upgrade.

## DDX-USR module > Reset

This procedure may be necessary if a DDX-USR has become unresponsive.

I Press-and-release the recessed reset button. The DDX-USR module will reboot.

## Recovering an unresponsive transmitter or receiver

If a firmware upgrade to a transmitter or receiver has failed, the unit may become unresponsive. If so, please follow the advice provided in other sections of this guide:

- <u>Recovering a transmitter</u>
- <u>Recovering a receiver</u>

## Operation

The DDX system is designed to be transparent in operation. A simple OSD (On Screen Display) interface allows each user to view and select from the available host computers.

## **VIEWING THE OSD**

## To view the OSD, either:

- From a console keyboard, press CTRL + ALT + M, or
- From a console mouse, press and hold the middle button and then press the right button. The OSD will be displayed:



## Thumbnail images

The outputs of the available host computers will be displayed within live thumbnail images.

Note: If video is not available for a computer, or the Thumbnails option has been set to OFF, a black image will be shown. See <u>Central Switch > OSD Settings</u>.

## Switch information

The additional information in the lower right corner, including the current IP address setting, firmware version and any current firmware upgrade warnings/ errors, is displayed within the OSD screen, providing the *Display System Info* option is set to ON. See <u>Central Switch > OSD Settings</u>.

## **Choosing a computer**

## To choose a computer using the mouse

I Display the OSD from your console using either of the methods shown left.

- 2 Hover the mouse pointer over the required screen image. A set of popup connection icons will be displayed:
  - 💽 View only you can view a computer's output but not alter it,
  - Shared access you can view and control a computer along with other consoles,
  - Exclusive multiple users can view a computer but only one (the first to make connection) can control it,

or

• O Private - you can view and control the computer privately while other users are locked out.

## For more details, see Access permissions.

Note: If an icon is grayed out, that access method is not available.

3 Click the required connection method. The video output from the chosen computer will be displayed full screen and you can use it as normal.

Note: When viewing the OSD, you can also click outside a computer thumbnail to return to your previous computer (with your last access permissions if still available).

## To choose a computer using hotkeys (without viewing the OSD)

• Press and hold **Ctrl** + **Alt** and type the number of the required computer. The video output from the chosen computer will be displayed full screen and you can use it as normal.

Note: Shared access mode is always used when the computer choice is made via hotkeys.

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## **USING AUDIO**

The DDX system fully supports stereo audio, with all audio devices being presented at the linked host computer as USB audio devices. There are slight differences in audio operation between DDX devices acting in a simple extender arrangement (without the use of a DDX switch) and a full DDX matrix installation.

## Using audio in a simple extender installation

The audio is presented to the computer's operating system as a USB headset with controls for input level, input mute, input AGC, sidetone level, sidetone mute, output level, output mute and output balance. The audio device is permanently presented to the computer when the DDX-CAM module powers up.

You can adjust the audio features using all of the standard operating system controls.

Note: Due to the architecture of the Codec, adjusting the input (microphone) level or muting the input (microphone) will also affect the sidetone level and mute.

## Using audio in a full DDX matrix installation

Audio functionality is enabled by default on all computers. For multi-head computers, audio is only enabled for the primary transmitter, although two audio devices will be presented to the computer, one for each transmitter. For multi-head consoles, audio is only enabled for the primary receiver.

## Managing audio in multi-user situations

- In all connection modes, the audio output of the computer is routed to the receiver from the transmitter.
- In View Only and Shared modes, the receiver input audio is ignored.
- In Exclusive and Private modes, the receiver input audio is routed to the transmitter.

Note: The above is equivalent to routing the output audio as per the video and the input audio as per the USB (except in View Only and Shared modes, where the input audio stream is ignored).

When viewing the OSD selection screen, input and output audio is suppressed.

The user who is currently in control of a computer can adjust the audio levels using the standard operating system audio features; their changes will affect the audio for all other users viewing the same computer. Additional users connected in View Mode, or additional Shared Access users who don't have control, can listen to the audio but at the volume dictated by the main user. As a user switches between machines, their audio levels are automatically adjusted to match their current connection.

## **INDICATORS**

The DDX switches, the DDX-CAM and DDX-USR modules contain various indicators to provide you with status information.

## **DDX** switch - Red front panel status indicators

The red status indicators on DDX switch front panels provide various key power and operation feedback:



## DDX switch - Green and amber network status indicators

The green and amber status indicators on the network link port provide further status information:



**INSTALLATION** 

CONFIGURATION

**OPERATION** 

## DDX-USR module - Green and amber status indicators

The green and amber indicators on the link port of each DDX-USR (console/ user) module provide the following status information:



## **DDX-CAM** module - Green and amber status indicators



**INSTALLATION** 

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The green and amber indicators on the link port of each DDX-CAM (computer) module provide the following status information:

Amber		Green	
Off:	No power	Off:	No power
Slow flashing:	Power present but no video	Slow flashing: Fast flashing:	Power present but no data link A firmware upgrade is being forced by
On:	Power present and video locked	On:	either the DDX switch or a DDX-USR Power present and link established

## **DDX-USR** module - Red front panel status indicators

The red indicators on the front panel of each DDX-USR (console/user) module provide the following status information:



## Special condition

**PWR** on, **Amber** flashing and **Green** off: Software fault requiring the DDX-USR module to be recovered. See <u>Configure > Consoles > Receivers</u>.

## **Special condition**

**Amber** flashing and **Green** off: Software fault requiring the DDX-CAM module to be recovered. See <u>Configure > Computers > Transmitters</u>.

**OPERATION** 

## Further information



**INSTALLATION** 

- Getting assistance see right
- Appendix I Link cable interference protection
- Appendix 2 Firmware upgrades for basic extender installations
- <u>Safety information</u>
- <u>Warranty</u>
- <u>Radio frequency energy statements</u>

## **GETTING ASSISTANCE**

If you are still experiencing problems after checking the information contained within this guide, then we provide a number of other solutions:

Online solutions and updates - <u>www.adder.com/support</u>

Check the Support section of the adder.com website for the latest solutions and firmware updates.

Technical support – <u>www.adder.com/contact-support-form</u>

For technical support, use the contact form in the Support section of the adder.com website - your regional office will then get in contact with you.

CONFIGURATION

## **APPENDIX I - LINK CABLE INTERFERENCE PROTECTION**

While the Category rating (e.g. CAT 5e, CAT 6a, CAT 7, etc.) determines the electrical performance of a cable, another vital part of the overall cable specification is its protection from interference. As cabling distances and data rates increase, so too does the susceptibility to interference, from both external and internal sources.

Proximity to other electromagnetic sources are the main external threat and these can be subdued using overall screening that surrounds all four of the cable pairs. However, interference is also possible from neighbouring twisted pairs within the same cable and this can be just as hazardous to data integrity. Such *crosstalk* is countered by shielding each cable pair separately.

Within each Category rating, you can specify different combinations of external screening and internal shielding to suit the environment into which the link is being placed.

Interference protection codes

Interference protection is classified in the following manner:



where

- $\mathbf{U}$  = unshielded
- **F** = foil shielding
- **S** = braided shielding
- **PiMF** = Pairs in Metal Foil

Note: Do not use unshielded cables with the DDX modules.





## APPENDIX 2 - FIRMWARE UPGRADES FOR BASIC EXTENDER INSTALLATIONS

Extender systems (or individual DDX-USR units) can be upgraded using a USB stick if required. This is carried out as follows:

- I Connect the DDX-USR to a compatible display and keyboard; optionally connect to a DDX-CAM module using a Shielded CAT6a or CAT7 data cable to upgrade it at the same time.
- 2 On the DDX-USR unit, insert a FAT32-formatted USB stick containing the extender firmware upgrade file into one of the front USB ports. *Note:The extender firmware upgrade file must be in the root folder.*
- 3 Apply power to the DDX-USR unit and DDX-CAM modules.
   IMPORTANT: Ensure power remains uninterrupted throughout the upgrade process.
- 4 Press-and-hold the recessed reset button for ten seconds until the PWR indicator begins to flash quickly, then release the reset button.
- 5 When prompted, type in the name of the extender firmware upgrade file and press Enter.
- 6 Type Y or N as appropriate, when asked if an attached (DDX-CAM) transmitter unit should also be upgraded.
- 7 The display will show the upgrade progress and confirmation message.
- 8 If successful the DDX-USR and DDX-CAM modules will automatically be rebooted and the USB stick can be removed.

## **SAFETY INFORMATION**

- For use in dry, oil free indoor environments only.
- Warning live parts contained within power adapter(s).
- No user serviceable parts within power adapter(s) do not dismantle.
- Plug the power adapter(s) into socket outlets close to the module that they are powering.
- Do not use an unearthed power socket or extension cable.
- Do not use a power adapter if its case becomes damaged, cracked or broken or if you suspect that it is not operating properly.
- Replace the power adapter(s) with a manufacturer approved type only.
- If you use a power extension cord with the module, make sure the total ampere rating of the devices plugged into the extension cord does not exceed the cord's ampere rating. Also, make sure that the total ampere rating of all the devices plugged into the wall outlet does not exceed the wall outlet's ampere rating.
- Do not attempt to service the modules yourself.

## WARRANTY

Adder Technology Ltd warrants that this product shall be free from defects in workmanship and materials for a period of two years from the date of original purchase. If the product should fail to operate correctly in normal use during the warranty period, Adder will replace or repair it free of charge. No liability can be accepted for damage due to misuse or circumstances outside Adder's control. Also Adder will not be responsible for any loss, damage or injury arising directly or indirectly from the use of this product. Adder's total liability under the terms of this warranty shall in all circumstances be limited to the replacement value of this product.

If any difficulty is experienced in the installation or use of this product that you are unable to resolve, please see the <u>Getting assistance</u> section.

## **RADIO FREQUENCY ENERGY**

A Category 5e (or better) twisted pair cable must be used to connect the units in order to maintain compliance with radio frequency energy emission regulations and ensure a suitably high level of immunity to electromagnetic disturbances.

All cables used with this equipment must be shielded in order to maintain compliance with radio frequency energy emission regulations and ensure a suitably high level of immunity to electromagnetic disturbances.

## European EMC directive 2004/108/EC

This equipment has been tested and found to comply with the limits for a class A computing device in accordance with the specifications in the European standard EN55032. These limits are designed to provide reasonable protection against harmful interference. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions may cause harmful interference to radio or television reception. However, there is no guarantee that harmful interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to correct the interference with one or more of the following measures: (a) Reorient or relocate the receiving antenna. (b) Increase the separation between the equipment and the receiver. (c) Connect the equipment to an outlet on a circuit different from that to which the receiver is connected. (d) Consult the supplier or an experienced radio/TV technician for help.

## FCC Compliance Statement (United States)

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 J 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 may 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 manufacturer could void the user's authority to operate the equipment.

## **Canadian Department of Communications RFI statement**

This equipment does not exceed the class A limits for radio noise emissions from digital apparatus set out in the radio interference regulations of the Canadian Department of Communications.

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 radioélectriques publié par le ministère des Communications du Canada.





Web:	www.adder.com
Contact:	www.adder.com/contact-details
Support:	www.adder.com/support



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