Gefen ®

4x1 DVI Switcher

EXT-DVI-441N
User Manual

www.gefen.com

ASKING FOR ASSISTANCE

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CONTENTS

Congratulations on your purchase of the Gefen 4x1 DVI Switcher. Your complete satisfaction is very important to us.

Gefen

Gefen delivers innovative, progressive computer and electronics add-on solutions that harness integration, extension, distribution and conversion technologies. Gefen's reliable, plug-and-play products supplement cross-platform computer systems, professional audio/video environments and HDTV systems of all sizes with hard-working solutions that are easy to implement and simple to operate.

The Gefen 4x1 DVI Switcher

The rack-mountable Gefen 4x1 DVI Switcher offers an economical solution by eliminating the need to purchase many displays for each DVI source in a studio or lab situation. A plug-and-play solution, the 4x1 DVI Switcher shares one DVI display with up to four computers or other DVI video sources, saving space on your desktop. The source computer is selected using the included IR remote control or through RS-232 control.

How It Works

The DVI monitor is connected to the switcher's output. Up to four DVI sources connect to the switcher's DVI inputs using included high quality DVI cables. The included power supply is connected to the switcher via the locking power plug and then to a power outlet. The currently selected computer's video signal appears on the shared monitor. Video sources are selected/switched using the RMT-4IR remote control, RS-232 control, or the input selector push button on the front panel of the switcher.

READ THESE NOTES BEFORE INSTALLING OR
OPERATING THE GEFEN 4X1 DVI SWITCHER

- The 4x1 DVI Switcher will take any of up to four (4) DVI single-link resolution inputs and switch them, one at a time, to a DVI output device such as a display/monitor or projector. Resolutions can be up to 1920x1200.

- The 4x1 DVI Switcher is housed in a metal box for better RF shielding.

- Computers must be turned on one at a time and the switcher must be selected to the computer that is booting up. Afterwards, switching may occur in any order. Please see page 6 for further details.

Features

• Switches easily between any four DVI sources

• Maintains highest resolution single-link DVI at 1920x1200

• Discrete IR remote control included

• Serial RS-232 remote port for switching via automated control or PC

• Supports DDWG standards for DVI monitors

Package Includes:

(1) Gefen 4x1 DVI Switcher
(4) 6 ft. DVI cables
(1) IR Remote Control Unit
(1) 5V DC Power Supply
(1) User Manual

Front Panel
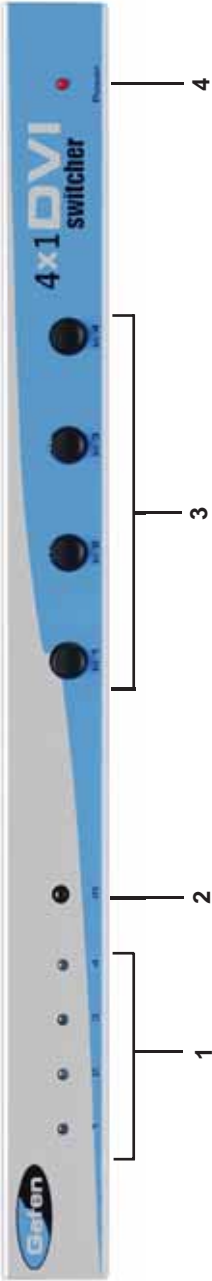
Back Panel

1   *Source Selection Indicator LEDs (Front Panel)*
These LEDs visually confirm the currently selected DVI source.

2   *IR Sensor (Front Panel)*
Receives IR control signals from the handheld Infrared remote control included with the DVI Switcher.

3   *Source Selector Buttons 1-4 (Front Panel)*
When any of these buttons is pressed, it tells the Switcher to display the corresponding numbered input source on the DVI output.

4   *Power Indicator LED (Front Panel)*
Indicates when the 4x1 DVI Switcher is correctly operating after receiving 5V DC power from its AC power supply (included).

5   *5V Power Input Jack (Back Panel)*
Supplies power to the 4x1 DVI Switcher from the included external 5V DC power supply.

6   *DVI Source Input Ports 1-4 (Back Panel)*
DVI video sources one through four attach to the 4x1 DVI Switcher.

7   *DVI Output Port (Back Panel)*
This DVI output port is connected to the display device (Monitor, Projector).

8   *RS-232 Serial Communications Interface (Back Panel)*
Provided for external control of the 4x1 DVI Switcher. Please see the section below which explains in detail the procedures necessary to send commands to the Switcher via RS-232 protocols.

9   *IR Extender Port (Back Panel)*
This jack allows connection of an optional IR extension cable and IR eye, Gefen Part No. EXT-RMT-EXTIR. The IR Extender allows the 4x1 DVI Switcher to be located up to 6 feet away from the IR Eye behind furniture or otherwise concealed in an unobtrusive location with only the IR Eye showing.

How to Connect the 4x1 DVI Switcher to your devices:

1. Connect the supplied DVI cables from the DVI sources into the 4x1 DVI Switcher's Inputs.

2. Connect the cable from your display (monitor or projector) into the DVI Out of the 4x1 DVI Switcher.

3. Connect the included 5V power supply, then plug it into the wall. Turn on the DVI display or projector first, then the video sources. Turn on the 4x1 DVI Switcher by screwing its 5V DC power supply tip into the receptacle in the rear of the chassis.

    Note: Computers must be turned on one at a time and the switcher must be selected to the computer that is booting up. This is so that monitor information (EDID) can be transmitted from the display to each computer. After one computer completes the startup process, you can boot up the second computer and repeat the process with the remaining computers. This can be avoided with the use of the LOCAL EDID mode (page 11) that will constantly supply each computer with an EDID. In this scenario, a stored EDID, or user uploaded EDID, is supplied to each input for use by the connected source device. Then, each computer can boot up in any order and at anytime, regardless of which computer the switch is selected to.

How to Operate the 4x1 DVI Switcher:

4. Use the RMT-4IR remote control to remotely switch between DVI video sources.

5. Alternatively, use a RS-232 control system such as a PC with communications software (for example, Microsoft's Hyperterminal[tm]) or an automated control system such as Crestron.[tm]

The RMT-4IR remote control will allow the user to select which of 4 DVI sources will be displayed. Please use the information below when selecting the desired source for output to a display or other DVI video receiving device.

RMT-4IR Button	DVI Source
1	1
2	2
3	3
4	4

To use the RMT-4IR remote, remove the battery cover on the back of the remote to reveal the battery compartment. Insert the included battery into the open battery slot. The positive (+) side should be facing up.

Ensure that both DIP (Dual Inline Package) switches are in the OFF position. Replace the battery cover. The remote ships with 2 batteries. One battery is needed for operation and the other battery is complimentary.

Empty Battery Slot

DIP Switches used to set IR codes (See p. 9)
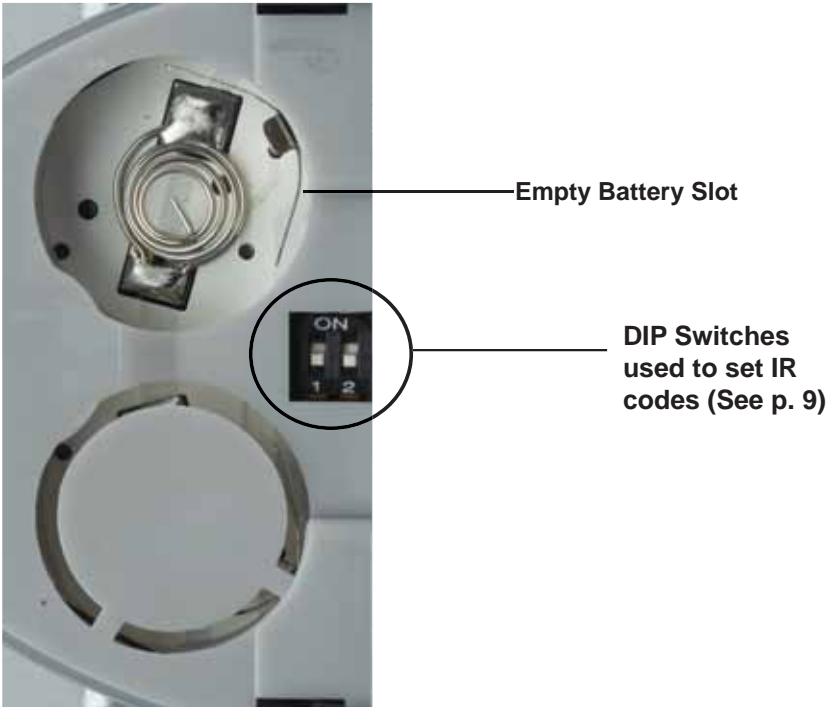
Above: Close up picture of the opened rear battery compartment of the RMT4-IR remote showing the exposed DIP Switch bank between the two battery chambers. This DIP switch bank controls the IR channel used by the IR Remote.

How to Resolve IR Code Conflicts

In the event that IR commands from other remote controls conflict with the supplied RMT-4IR remote control, changing the remote control channel will alleviate this issue.
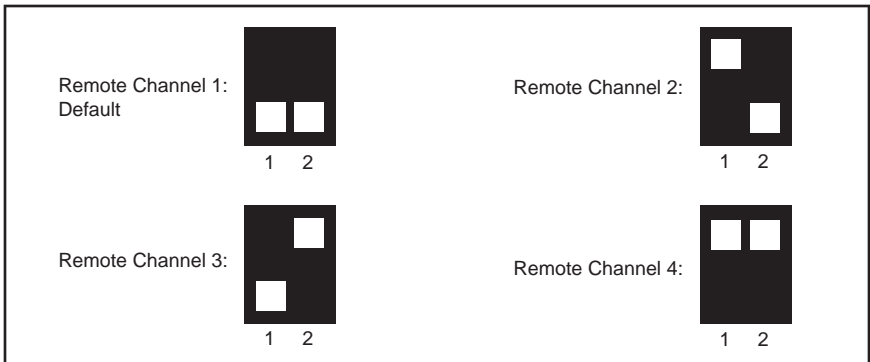
The RMT-4IR remote control and the 4x1 DVI Switcher both have banks of small switches known as DIP (Dual Inline Package) Switches for configuring the remote channel that they will both share to communicate.

The DIP Switch bank on the IR Remote is located underneath the battery cover (see page 8). The DIP Switch bank for the Switcher is located on the underside of the Switcher beneath a piece of grey or black metallic tape.

On the Switcher, there are two DIP switch banks. The 4-switch bank is for the adjustment of remote control frequencies. The 8-slot DIP switch bank is reserved for Gefen use only.

DIP Switches 1 and 2 on the RMT-4IR directly correspond to DIP Switches 1 and 2 on the 4x1 DVI Switcher. These are the only switches used to adjust IR channels. Please study the following diagram before making changes.

IR Remote Control - DIP Switch Settings

Remote Channel 1: Default   1   2

Remote Channel 2:   1   2

Remote Channel 3:   1   2

Remote Channel 4:   1   2

4x1 DVI Switcher - DIP Switch Settings

Remote Channel 1: Default   1 2 3 4

Remote Channel 2:   1 2 3 4

Remote Channel 3:   1 2 3 4

Remote Channel 4:   1 2 3 4
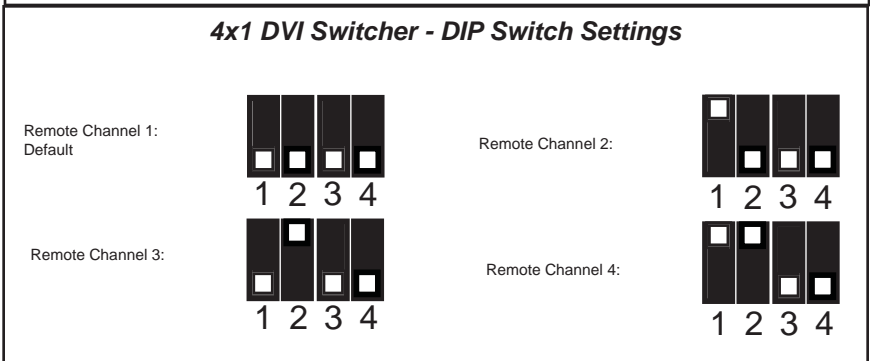
What is EDID and what is it used for?

Under normal circumstances, an audio/video source device (digital or analog) will require information about a connected device/display to assess what resolutions and features (capabilities) are possible. The source device can then cater its output to create resolutions and/or features that are compatible with the attached device/display.

This capability information is called EDID (Extended Display Identification Data). A source device can only accept and read one EDID data structure/record from a connected output device/display device. Likewise, the source device can output only one video resolution to a connected output device/display.

The importance of EDID with regards to the 4x1 DVI Switcher

The 4x1 DVI Switcher handles multiple sources/inputs. Each connected source device must correctly read one EDID data structure in order to address its display device correctly. EDID management is carefully handled by the 4x1 DVI Switcher to insure that EDID is recorded and retransmitted properly, otherwise display of input sources might not happen correctly (or at all).

Managing EDID with the 4x1 DVI Switcher

The 4x1 DVI Switcher has the ability to use 2 modes for routing EDID.

1. The LOCAL mode stores the EDID of each connected source device into its own dedicated separate LOCAL EDID memory location in the 4x1 DVI Switcher. EDIDs can be from local display devices or from remote sources over the RS-232 serial communications port. The Switcher also stores up to 7 separate EDIDs which can be copied to LOCAL EDID locations.

2. The second mode is the DS (Down Stream) mode which functions as a simple EDID pass-through. In this mode, the display device connected to the 4x1 DVI Switcher 's output will pass its EDID directly to whichever DVI input source is currently selected.

### *How do I change EDID modes in the 4x1 DVI Switcher?*

There is an bank of 4 DIP switches located on the main circuit board on the underside of the 4x1 DVI Switcher. DIP switch 3 can be used to set either the DS or LOCAL EDID modes.

TIP: Advanced EDID functions can also be managed via the RS-232 serial communications port. See page 13 for more information on the RS-232 serial communication features.

EDID Modes

The diagram below illustrates the DIP switch bank (of 4). The 8 DIP switch bank functions are outlined later on this page.

DIP SWITCH	Function
1	IR Channel
2	IR Channel
3	EDID Mode
4	N/A
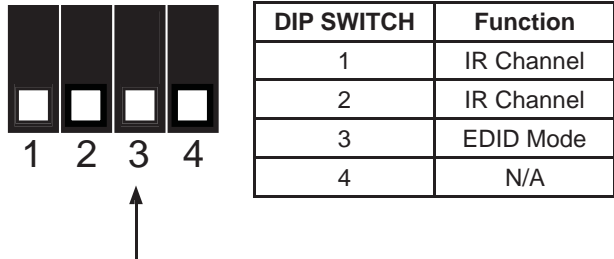
Use DIP switch 3 to set the desired EDID mode.

LOCAL EDID Mode (Switch 3=OFF)

- EDID that is stored in the LOCAL memory location is passed to all inputs.

- By default, during each power-on process the connected display's EDID will be automatically copied to each of the inputs' LOCAL EDID memory locations.*

- The EDID stored in the LOCAL locations can be overwritten with another EDID from the following locations (only possible when using RS-232 serial communication commands):

    - Built-in EDID memory bank (up to 7 EDID records stored)

    - EDID collected directly from the input display*

    - Externally uploaded via the RS-232 command set

*For the default EDID writing process to be successful, the connected output device or display must be powered on.

DS (Down Stream) EDID Mode (Switch 3=ON) DEFAULT

- EDID is passed directly from the connected display to the currently active/selected input on the Switcher.

What features are available via the RS-232 serial communications port?

The 4x1 DVI Switcher can accept commands through the RS-232 serial communications port located on the rear panel. The current RS-232 control features are:

• Switching of inputs to outputs without the IR Remote.

• Switch EDID modes without operating the DIP switches.

• Manage the EDID and LOCAL EDID memory banks / locations.

• Upload new EDID data to EDID and LOCAL EDID memory banks /locations.

How do I use these features?

These features were initially intended for utilization by custom installers in automated setups. However, these features can be tested by using any Windows PC with the Hyperterminal program.

What pins are used for communication with the 4x1 DVI Switcher?

Only pins 2 (Receive), 3 (Transmit), and 5 (Ground) are used for communication. A null-modem adapter should not be used with this Switcher.
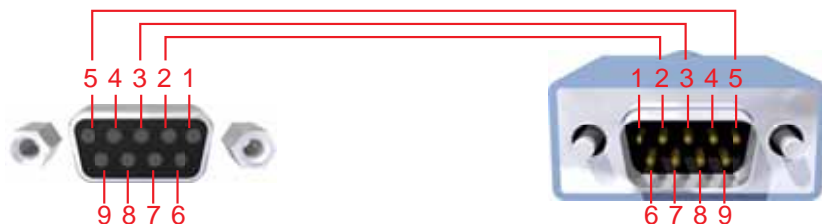
Only Pins 2 (RX), 3 (TX), and 5 (Ground) are used on the RS-232 serial interface

What are the RS-232 communications port settings?

Bits per second 19200

Data bits 8

Parity .... None

Stop bits 1

Flow Control .... None

1. ECHO PROTOCOL

Definition:

Semi echo mode – the Switcher echoes every byte it receives, except when receiving EDID data structures/records.

Full echo mode – the Switcher echoes every byte it receives, even when receiving EDID data structures/records.

The default operating mode is Semi echo mode.

If working with Hyperterminal under Microsoft Windows[tm], choose the semi echo mode.

2. REMOTE FUNCTION

The remote functions are used to modify settings on the Switcher, such as:

Input to output routing, EDID memories management etc.

These functions are available only by using serial port commands.

2.1 MODIFY BY SHORT-CUT CHARACTER

Switching command

The character below indicates which input will route to the output.

ASCII	Input	Binary
1	1	0011 0001
2	2	0011 0010
3	3	0011 0011
4	4	0011 0100

Setting function menu

The 'P' or 'p' command will present the menu for setting functions.

2.2 MODIFY BY FUNCTION

The syntax for invoking functions is as follows. The '#' character is the start flag followed by the function name in capital letters and a space. The space delineates the end of the function name. The parameters required for each function are separated by a space and end with the '\r' character or "Enter".

#FunctionName_param1_param2_param3_param4…\r

DS EDID store in local inputs' EDID memory

This function reads an EDID record from DS and stores it in all the local inputs' EDID memory banks.

#EDIDDSTOLO

DS EDID store in EDID Memory Bank

This function reads an EDID from DS and stores it in an EDID bank.

#EDIDDSTOBA_param1\r

Parameter	Name	Value
1	EDID bank offset	[1 : 7]

Read EDID from EDID Memory Bank & Store in Local EDID Memories

This function reads an EDID record from the EDID bank and stores it in all Inputs' local EDID memory banks.

#EDIDBATOLO_param1\r

Parameter	Name	Value
1	EDID bank offset	[1 : 7]

Route Input DDC to DS EDID

This function routes Input's DDC to DS EDID (pass-through mode).

#DDCTODS

Route Input DDC to Local EDID

This function routes Input's DDC to Local EDID.

#DDCTOLO

Print DS EDID

This function reads DS EDID and sends it to the serial port.

#PRDSEDID_param1\r

Parameter	Name	Value
1	Send BIN file	0
	Send TXT file	1

Print Local EDID

This function reads the Input's Local EDID and sends it to the serial port.

#PRLOEDID_param1 \r

Parameter	Name	Value
1	Send BIN file	0
	Send TXT file	1

Print EDID bank

This function reads EDID data from the EDID bank and sends it to the serial port.

#PRBAEDID_param1_param2\r

Parameter	Name	Value
1	EDID bank offset	[1 : 7]
	Send BIN file	0
2	Send TXT file	1

Load EDID to Locals EDID

This function loads EDID data through the serial port and stores it in any Input's Local EDID memory bank.

#LOEDIDTOLO_param1_param2\r

Parameter	Name	Value
1	Semi echo mode	0
	Full echo mode	1
2	EDID.bin file(128 bytes)	1
	EDID.bin file(256 bytes)	2

Load EDID to EDID bank

This function loads EDID through the serial port and stores it in the EDID bank.

#LOEDIDTOBA_param1_param2\r

Parameter	Name	Value
1	Semi echo mode	0
	Full echo mode	1
2	EDID.bin file(128 bytes)	1
	EDID.bin file(256 bytes)	2
3	EDID bank offset	[1 : 7]

Set default setting

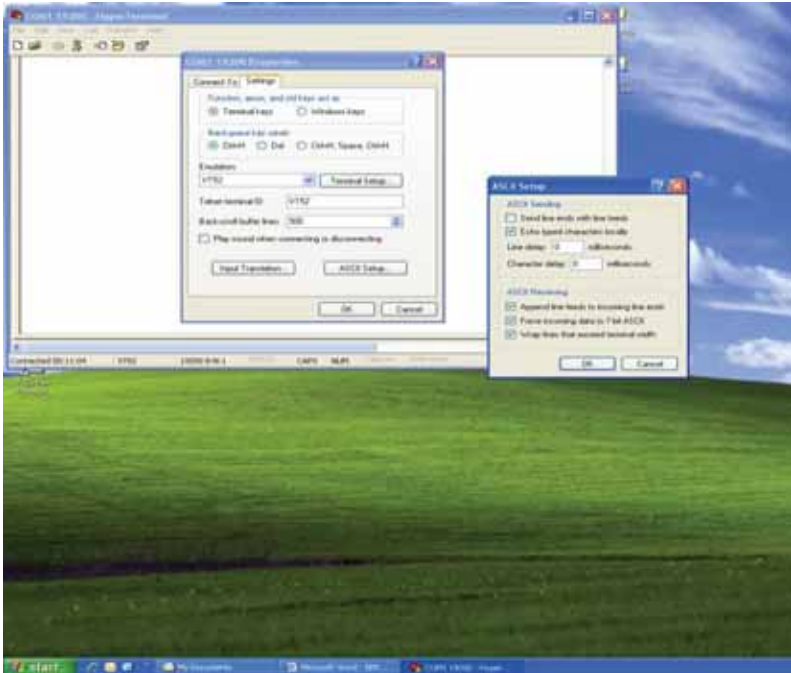This function reinitializes the Switcher with default factory settings.

1. All the features are set according to the position of the hardware switches.

#DEF\r

3. HOW TO LOAD FILE WITH HYPER TERMINAL

3.1 HYPER TERMINAL SETTING

File->Properties->Setting->ASCII Setup:

Unmark the check box of "Send line ends with Line feeds"

3.2 SEND THE FILE

Transfer->Send text file…

Change "Files of type:" to "All files (*.*)"

Open the file.BIN to send

Wait until "Function Done"

SPECIFICATIONS

Maximum Pixel Clock...165 MHz

Input Video Signal...1.2 Volts p-p

Input DDC Signal...5 Volts p-p (TTL)

Single Link Range..1920 x 1200

DVI Connectors..DVI-I 29-pin female (digital only)

Power Supply...5 V DC

Power Consumption...20 Watts (max.)

Dimensions..14" W x 1.2" H x 2.9" D

Shipping Weight...7 lbs.

WARRANTY

Gefen warrants the equipment it manufactures to be free from defects in material and workmanship.

If equipment fails because of such defects and Gefen is notified within two (2) years from the date of shipment, Gefen will, at its option, repair or replace the equipment, provided that the equipment has not been subjected to mechanical, electrical, or other abuse or modifications. Equipment that fails under conditions other than those covered will be repaired at the current price of parts and labor in effect at the time of repair. Such repairs are warranted for ninety (90) days from the day of reshipment to the Buyer.

This warranty is in lieu of all other warranties expressed or implied, including without limitation, any implied warranty or merchantability or fitness for any particular purpose, all of which are expressly disclaimed.

1. Proof of sale may be required in order to claim warranty.

2. Customers outside the US are responsible for shipping charges to and from Gefen.

3. Copper cables are limited to a 30 day warranty and cables must be in their original condition.

The information in this manual has been carefully checked and is believed to be accurate. However, Gefen assumes no responsibility for any inaccuracies that may be contained in this manual. In no event will Gefen be liable for direct, indirect, special, incidental, or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. The technical information contained herein regarding the features and specifications is subject to change without notice.

For the latest warranty coverage information, please visit Gefen's Warranty web page at http://www.gefen.com/kvm/aboutus/warranty.jsp

PRODUCT REGISTRATION

**Please register your product online by visiting Gefen's web site at
http://www.gefen.com/kvm/Registry/Registration.jsp**

MA-DVI-441N

This product uses UL listed power supplies.