Kramer Electronics, Ltd.

USER MANUAL

Model:

VS-40FW

FireWire® 800/1394b Repeater / HUB

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 1,000-plus different models now appear in 11 groups[1] that are clearly defined by function.

Congratulations on purchasing the Kramer DigiTOOLS® **VS-40FW** *FireWire® 800/1394b Repeater / HUB,* which is ideal for:

- Digital video production and editing studios
- Digital video live broadcasting
- PC FireWire® port extensions and long cable drive

Each package includes the following items:

- **VS-40FW** *FireWire® 800/1394b Repeater / HUB*
- Power adapter (12V DC Input)
- 1 0.9m (3ft) 9-pin FireWire® cable
- This user manual[2]

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high-performance high-resolution cables[3]

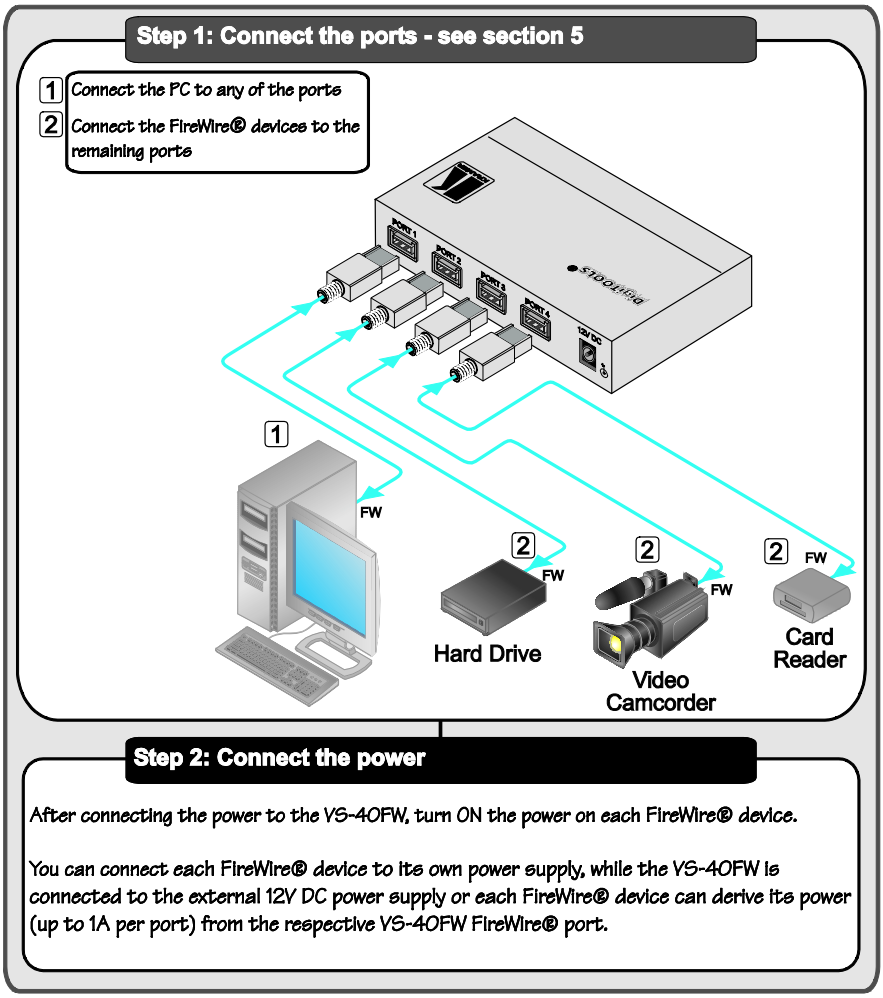
1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Products

2 Download up-to-date Kramer user manuals from our Web site at http://www.kramerelectronics.com

3 The complete list of Kramer cables is on our Web site at http://www.kramerelectronics.com

2.1 Quick Start

This quick start chart summarizes the basic setup and operation steps.



3 Overview

This section summarizes:

- The **VS-40FW** see (section 3.1)
- FireWire® (see section 3.2), FireWire® 800 (see section 3.2.1) and FireWire® compliance (see section 3.2.2)
- How to achieve the best performance (see section 3.3)

3.1 About the VS-40FW

The **VS-40FW** is a high-performance bidirectional hub/repeater for 9-pin FireWire® 800 (IEEE 1394b) signals. It increases the number of ports available and/or extends the distance of FireWire® cable runs.

The **VS-40FW** features:

- 4 bidirectional IEEE 1394b 800Mbps (S800) ports
- A range of up to 9m (30ft). This is double the FireWire® range of 4.5m (15ft). Multiple units can be cascaded to extend the range to up to 72m (240ft)
- Support for Plug and Play[1], hot swapping[2] and isochronous[3] and asynchronous applications
- Transfer Rates of 100, 200, 400 and 800Mbps
- ESD Protection[4] - incorporates Kramer's Spark-Guard Pro™ signal protection circuitry to help protect against EDS (electrostatic discharge) that can damage digital equipment

The **VS-40FW** can supply up to 2.1A to the bus (each port can provide up to 1A). An external 12V DC power supply, or can be powered via a FireWire® connection from a PC.

1 When a device is added or removed, the 1394 bus re-enumerates and configures automatically

2 You can connect and disconnect inputs and outputs dynamically, without having to restart the PC or cycle power

3 Video/audio applications require constant transfer rates, which the serial bus provides by supporting isochronous transfers

4 Sometimes when connecting a "live" DV source to a receptor, an electrical potential difference or any other element creating a high voltage (such as ESD or a live chassis) may permanently damage one or both of the connected devices. This high voltage may be seen as a spark occurring at the instant of connection, or may not be seen at all, but nevertheless can result in costly damage

3.2 About FireWire®

FireWire® is a serial bus standard[1] that enables quick universal interfacing between video and computer hardware items[2]. It is simple to use and operates independently of the host system, letting you connect more items than you otherwise could (as a computer only has limited ports available), and for extended distances. Several can be cascaded to create up to a 63 port FireWire® Repeater / HUB. FireWire® **s**upports Plug and Play[3], and isochronous[4] and asynchronous applications.

Many computers have one or more FireWire® ports on the rear panel letting you quickly attach many devices to your computer. The operating system also supports FireWire®, enabling quick installation of the device drivers. Compared to other ways of connecting devices to your computer (including parallel ports, serial ports and special cards that you install inside the computer's case), FireWire® devices are simple. Many peripheral devices, such as DV camcorders, digital still cameras, external hard drives and disk arrays, network connections, and scanners and printers come in a FireWire® version. To connect a FireWire® device to a computer is easy (just plug it into the port). If the device is not yet installed, the operating system auto-detects it and installs software support for it automatically. If the device has already been installed, the computer activates it and starts communicating with it. With so many FireWire® devices on the market today, you easily run out of ports. Use a FireWire® hub to expand the number of FireWire® ports. The FireWire® standard supports up to 63 devices and FireWire® hubs are a part of the standard. You plug the hub into your computer, and then plug your devices (or other hubs) into the hub. By chaining hubs together, you can build up dozens of available FireWire® ports on a single computer. A FireWire® hub is like a network, with bi-directional signals. The standard defines FireWire® as Peer-to-Peer connection; that is why two devices, or a device and a computer can talk to each other.

Note that everything depends on your computer's software, and the firmware of the devices. Sometimes a computer can work with many FireWire® devices simultaneously (like a distributor), sometimes it can work with many devices in time-sharing mode (like a switcher). But usually it is possible to work one-to-one. In this case, you have to disconnect all the devices that are unnecessary at this time and leave only two of them. Since the FireWire® is hot-plug standard, you can connect/disconnect devices at any time.

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1 Originally developed by Apple™ and published as IEEE 1394 by the Institute of Electrical and Electronics Engineers

2 Hardware items include digital cameras, computers, printers, VCRs, CD-ROMs, hard disks, scanners and graphic cards

3 Configures automatically. Whenever a device is added or removed the 1394 bus re-enumerates

4 Video / audio applications require constant transfer rates, which the serial bus provides by supporting isochronous transfers

Hubs can be powered or unpowered. The FireWire® standard lets devices draw their power from their FireWire® connection. Obviously, a high-power device, like a professional DV camcorder, will have its own power supply, but low-power devices like a Webcam derive their power from the bus in order to simplify them. The power for this (up to 1 amp at 12 volts) comes from the computer. If you have several self-powered devices, then your hub does not need to be powered, as none of the devices connecting to the hub need additional power, and the hub itself can derive power from the computer. If you have many unpowered devices, you probably need a powered hub. The hub has to be powered from an AC adapter, which supplies power to the bus.

3.2.1 About FireWire® 800

FireWire® 800 (IEEE 1394b) is twice as fast as FireWire 400 (IEEE 1394a) up to 800 Mbit/sec, and also greatly increases the maximum transmission distance.

3.2.2 FireWire® Compliance

Your **VS-40FW** *FireWire® 800/1394b Repeater / HUB*:

- Fully supports the provisions of the IEEE P1394b Revision 1.33+ at 1-Gigabit signaling rates
- Fully supports the provisions of the IEEE 1394-1995 Standard for High Performance Serial Bus and the P1394a Supplement
- Is fully interoperable with FireWire® and i.LINK™ implementation of IEEE Std 1394
- Provides three fully backward compatible (1394a-2000 fully compliant) bilingual P1394b cable ports at up to 800 Megabits per second (Mbits/s)
- Is fully compliant with OpenHCI requirements
- Provides P1394a Fully Compliant Cable Ports at 100/200/400 Megabits per Second (Mbits/s)
- Includes full P1394a support, that is, Connection Debounce, Arbitrated Short Reset, Multispeed Concatenation, Arbitration Acceleration, Fly-By Concatenation, Port Disable/Suspend/Resume
- Includes Extended Resume Signaling for Compatibility with Legacy DV Devices

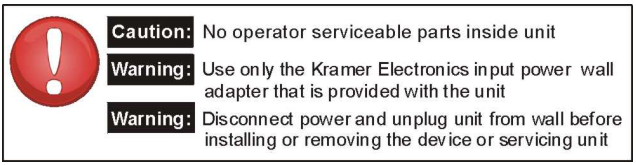
3.3 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables).
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality and position your Kramer devices away from moisture, excessive sunlight and dust

Before connecting, note that:

- When using a FireWire® cable, always align the cable connector to the port and do not force the plug into the port, if the cable does not slide in easily, check that it is aligned and then connect again. If you cannot insert the cable connector into the port, consider replacing the DV board in your computer
- When connecting a device, such as a digital camera or tape, always connect the power to that device after you have connected the device to the ports[1] on the Kramer machine or computer



1 This does not apply to equipment that is operated by batteries

4 Your VS-40FW FireWire® 800/1394b Repeater / HUB

Figure 1 and Table 1 define the **VS-40FW**:

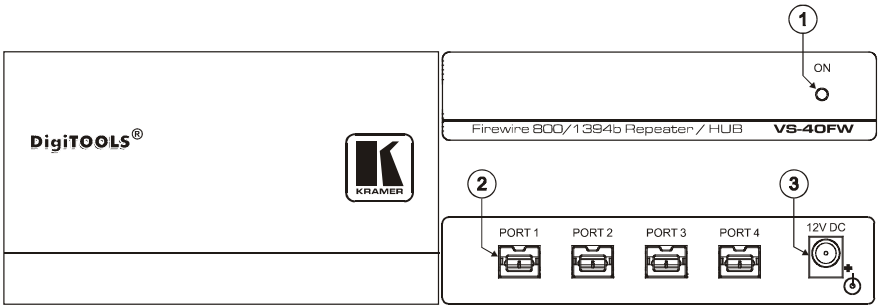


Figure 1: VS-40FW FireWire® 800/1394b Repeater / HUB

Table 1: VS-40FW FireWire® 800/1394b Repeater / HUB Features

#	Feature	Function
1	*ON* LED	Lights green when receiving power
2	*PORT 1*	Connects to the FireWire® device (from 1 to 4)
3	*12V DC*	+12V DC connector for powering the unit

5 Connecting the VS-40FW

To connect the **VS-40FW** *FireWire® 800/1394b Repeater / HUB*, as illustrated in the example in Figure 2, do the following:

1. Connect the PC to one of the ports (for example, PORT 1).
2. Connect up to three FireWire® devices to the remaining three ports[1] (for example: PORT 2 to a hard drive, PORT 3 to a video camcorder and PORT 4 to a card reader).
3. Connect the power to the FireWire® devices.
4. Connect the 12V DC power adapter (see section 5.1) to the power socket and connect the adapter to the mains electricity.
   The ON green LED lights.
5. Turn the power ON on each device (see section 5.1).

1 Not all ports need to be connected. Any unused port should simply be left unconnected

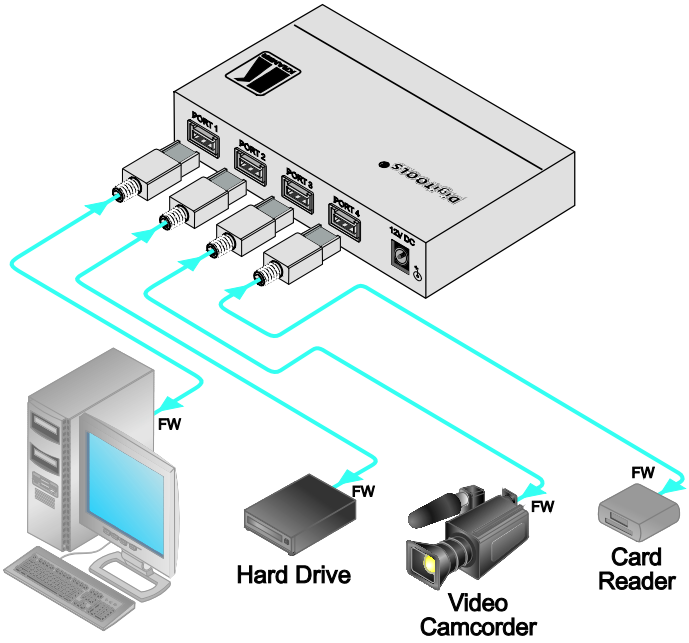


Figure 2: Connecting the VS-40FW FireWire® 800/1394b Repeater / HUB

5.1 Powering the FireWire® Devices

Each FireWire® device can derive its power in one of two ways:

- Independently, by connecting each FireWire® device to its own power supply, while the **VS-40FW** is connected to the external 12V DC power supply (provided with the **VS-40FW**)
- Via the **VS-40FW** that is connected to an external 12V DC power. In this case, each of the four FireWire® devices can derive their power (up to 1A per port) from the respective **VS-40FW** FireWire® port

6 Technical Specifications

Table 2 includes the technical specifications:

Table 2: Technical Specifications[1] of the VS-40FW

PORTS:	4 bidirectional IEEE 1394b 800Mbps (S800) ports
TRANSFER RATE:	100/200/400/800Mbps[2] (S800, S400, S200, S100)
STANDARDS:	IEEE 1394-1995, IEEE P1394a, IEEE P1394b Fully supports the provisions of the IEEE P1394b Revision 1.33+ at 1 Gigabit signaling rates; Fully supports the provisions of the IEEE 1394-1995 Standard for High Performance Serial Bus and the P1394a Supplement; Fully interoperable with FireWire™ and i.LINK™ implementation of IEEE Std 1394; Provides three fully backward compatible (1394a 2000 fully compliant) bilingual P1394b cable ports at up to 800 Megabits per second (Mbits/s); Fully compliant with OpenHCI requirements; Provides three P1394b Fully Compliant Cable Ports at 100/200/400/800 Megabits per Second (Mbits/s); Full P1394a support includes: Connection Debounce, Arbitrated Short Reset, Multispeed Concatenation, Arbitration Acceleration, Fly-By Concatenation, Port Disable/Suspend/Resume; Extended Resume Signaling for Compatibility with Legacy DV Devices
POWER SOURCE:	12V DC, 1A
DIMENSIONS:	12cm x 7.5cm x 2.5cm (4.7" x 2.95" x 0.98") W, D, H
WEIGHT:	0.3kg (0.67lbs) approx.
ACCESSORIES:	Power supply (12V, 2.1A), mounting bracket, 1 0.9m (3ft) 9-pin FireWire® cable
OPTIONS:	Adapting cables[3], RK-3T 19" rack adapter, 0.9m (3ft) 9-pin FireWire® cables[4]

1 Specifications are subject to change without notice

2 Legacy FireWire speeds

3 For details, refer to our Web site at http://www.kramerelectronics.com

4 C-FM9/FM9-3

LIMITED WARRANTY

Kramer Electronics (hereafter *Kramer*) warrants this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for seven years from the date of the first customer purchase.

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with.
3. Damage, deterioration or malfunction resulting from:
   i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
   ii) Product modification, or failure to follow instructions supplied with the product
   iii) Repair or attempted repair by anyone not authorized by Kramer
   iv) Any shipment of the product (claims must be presented to the carrier)
   v) Removal or installation of the product
   vi) Any other cause, which does not relate to a product defect
   vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

This equipment has been tested to determine compliance with the requirements of:

EN-50081:	"Electromagnetic compatibility (EMC); generic emission standard. Part 1: Residential, commercial and light industry"
EN-50082:	"Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".
CFR-47:	FCC* Rules and Regulations: Part 15: “Radio frequency devices Subpart B Unintentional radiators”

CAUTION!

- Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- Use the supplied DC power supply to feed power to the machine.
- Please use recommended interconnection cables to connect the machine to other components.

* FCC and CE approved using STP cable (for twisted pair products)

For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com where updates to this user manual may be found.
We welcome your questions, comments and feedback.

Safety Warning:
Disconnect the unit from the power supply before opening/servicing.

Kramer Electronics, Ltd.
Web site: www.kramerelectronics.com
E-mail: info@kramerel.com
P/N: 2900-000583 REV 2