

CLV-401 CAMERA LINK™ VIDEO SPLITTER

User's Manual

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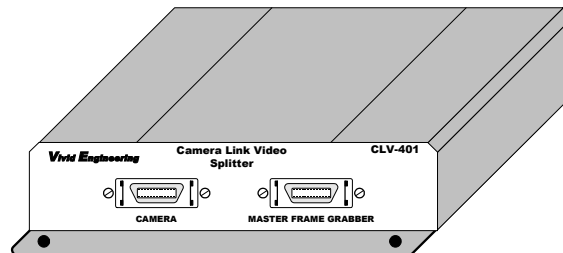
1. Introduction

1.1. Overview

The CLV-401 Camera Link™¹ Video Splitter interfaces one Camera Link™ camera to two frame grabbers using standard Camera Link™ cables. This arrangement enables the addition of a second frame grabber for functions such as camera setup, secondary/parallel processing, and monitoring.

One frame grabber acts as master (i.e. primary) and provides control and communications to the camera. The secondary (slave) frame grabber receives camera video data only. The CLV-401 supports the Camera Link™ “base” configuration. “Medium” configuration applications are supported using two CLV-401s. Multiple CLV-401s may be cascaded to support 4 or 8 frame grabbers.

The CLV-401 Camera Link™ Video Splitter is housed in a sturdy, compact aluminum enclosure and is well suited for industrial environments.



¹ The Camera Link™ interface standard enables the interoperability of cameras and frame grabbers, regardless of vendor. The Automated Imaging Association (AIA) sponsors the Camera Link™ program including the oversight Camera Link Committee, the self-certification program, and the product registry. The Camera Link™ specification may be downloaded from the AIA website, found at www.machinevisiononline.org

Camera Link™ is a trademark of the Automated Imaging Association

1.2. Features

- Interfaces one camera to two frame grabbers
- Second frame grabber can be used for camera setup, processing, monitoring, etc
- Uses standard Camera Link™ cables (not included)
- Supports Camera Link™ “base” configurations
- “Medium” configuration support using two CLV-401s
- Also acts as a repeater, doubling max distance between camera and frame grabber
- Sturdy, compact aluminum enclosure w/ mounting flange
- FCC, Canadian, and CE Regulatory Compliance
- 3-year warrantee

1.3. Functional Description

A block diagram of the CLV-401 is provided in Figure 1-1. The CLV-401 interfaces one camera to two frame grabbers. One frame grabber is the master (primary), and one frame grabber is slave (secondary).

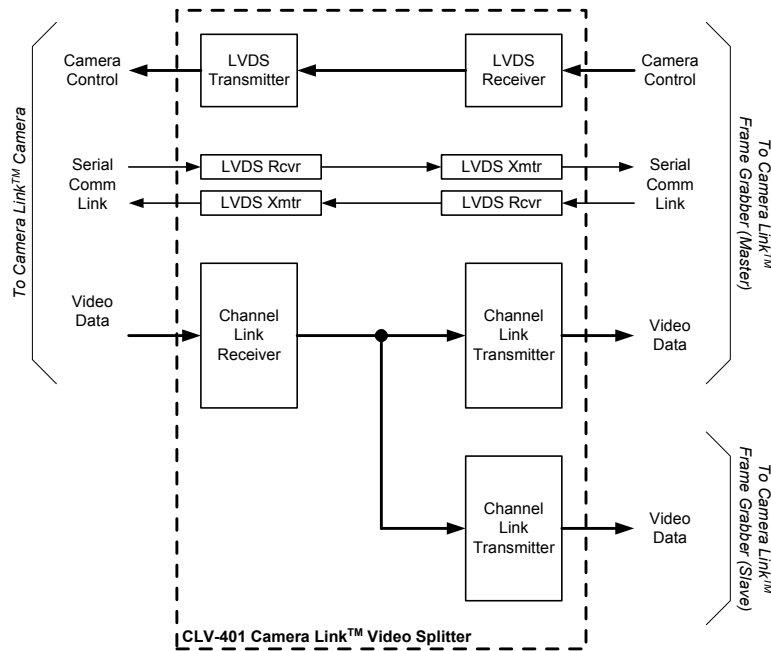


Figure 1-1: CLV-401 Block Diagram

The interface between the camera and the *master* frame grabber contains the entire Camera Link™ signal set defined in the Camera Link Specification for “base” configurations. This consists of video data, camera control, and serial communications. The master frame grabber receives video data from the camera, and can also control and communicate with the camera.

The interface between the camera and the *slave* frame grabber contains only the video data signals. The slave frame grabber receives video data, but cannot control or communicate with the camera.

Since the CLV-401 regenerates all signals, it also acts as a repeater and supports an additional 10 meters of separation between camera and frame grabbers(s) using standard Camera Link™ cables.

The CLV-401 is also compatible with the second Camera Link™ cable used in the “medium” configuration, enabling a pair of CLV-401s to be used in parallel to support medium configuration applications.

The CLV-401 is powered by an external wall plug-in power supply.

1.4. Typical Applications

1.4.1. Standard Base Application

A standard CLV-401 base application is shown in Figure 1-2. A Camera Link™ base configuration camera is connected to a single CLV-401 via a standard Camera Link™ cable. Two additional Camera Link™ cables are then used to connect the CLV-401 to the master and slave Camera Link™ frame grabbers.

The master frame grabber provides camera control and communications, and performs the primary processing functions. The slave frame grabber cannot control or communicate with the camera, but may be used for parallel processing, secondary processing, camera setup, monitoring, etc.

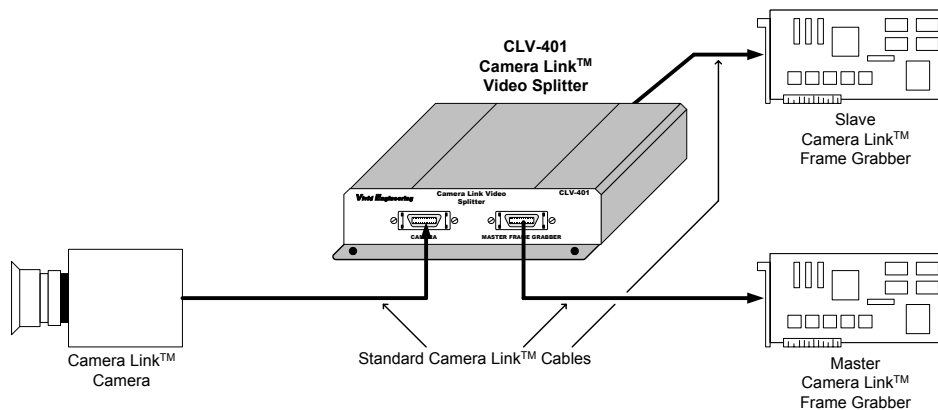


Figure 1-2: CLV-401 Standard Application (Base)

1.4.2. Medium Application

A CLV-401 medium application is shown in Figure 1-3. Medium configurations, in which two cables connect the camera to the frame grabber, are supported using two CLV-401s in parallel. A Camera Link™ medium configuration camera is connected to two CLV-401s via a pair of standard Camera Link™ cables. Four additional Camera Link™ cables are then used to connect the CLV-401s to the master and slave Camera Link™ frame grabbers.

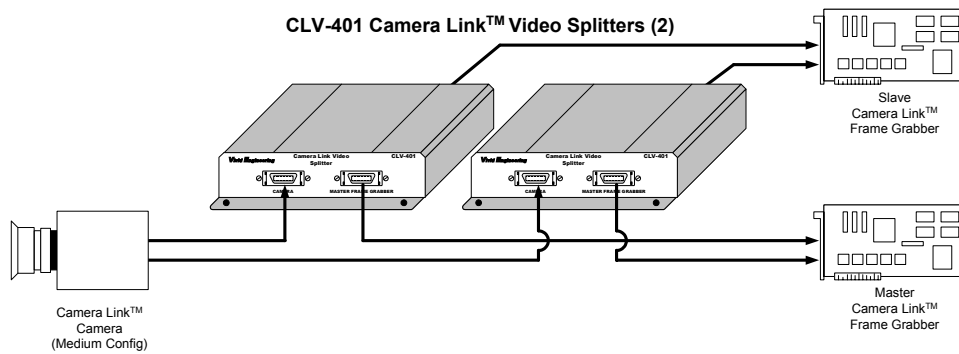


Figure 1-3: CLV-401 “Medium” Application

1.4.3. Cascaded Application

Multiple CLV-401s may be cascaded to support four or eight frame grabbers. An application in which three CLV-401s are cascaded to interface four frame grabbers to a Camera Link™ base configuration camera is shown in Figure 1-4. Seven standard Camera Link™ cables are used to interconnect the equipment. Note that one frame grabber is the master, and all remaining frame grabbers are slaves.

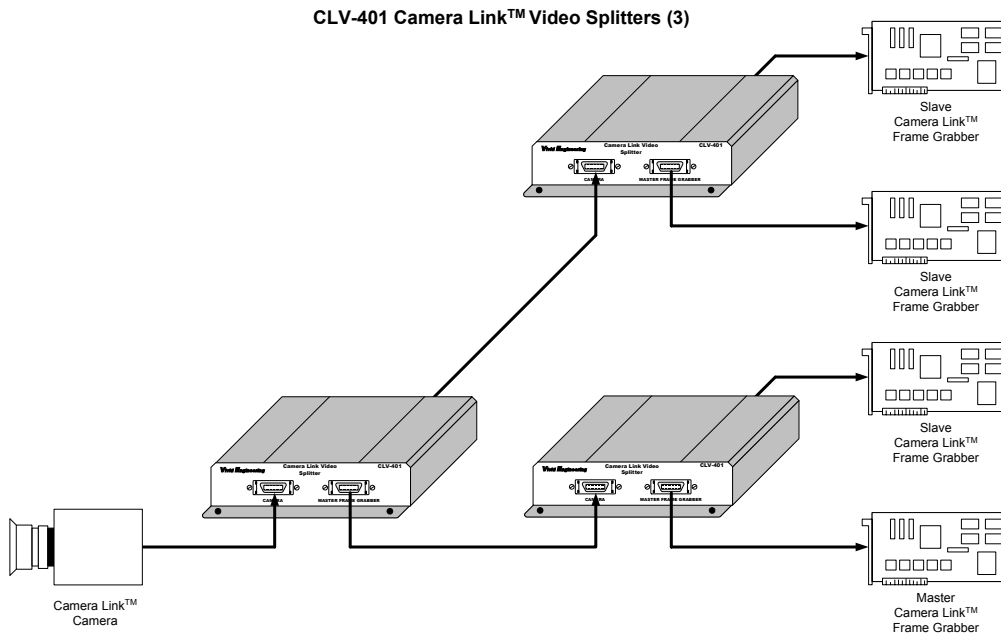


Figure 1-4: CLV-401 Cascaded Application

1.5. Specifications

Table 1-1: CLV-401 Specifications

Feature	Specification
Video Interfaces	Camera Link Spec "base" configuration
Video Connectors	26-pin MDR type
Frequency Range	20 - 66 MHz
Chipset	National Semi. DS90CR285 / DS90CR286A
Power Supply	Optional US/Europe Transformer w/ Outlet Plug Set
Power Jack	2.1 x 5.5 mm, center-positive
Power Requirements	5-7 VDC, 350 mA (typical)
Cabinet Dimensions	5.28" (L) x 1.18" (H) 6.12" (D)
Weight	13 oz
Operating Temperature Range	0 to 50° C
Storage Temperature Range	-25 to 75° C
Relative Humidity	0 to 90%, non-condensing

2. Interface

2.1. Front Panel Connections

The CLV-401 Camera Link™ Video Splitter front panel is shown in Figure 2-1. The front panel contains two 26-pin MDR video connectors; one for connecting to the camera and one for connecting to the master frame grabber. The MDR-26 connectors are 3M p/n 10226-55G3VC as specified in the Camera Link Spec. Figure 2-2 identifies the MDR-26 pin positions.

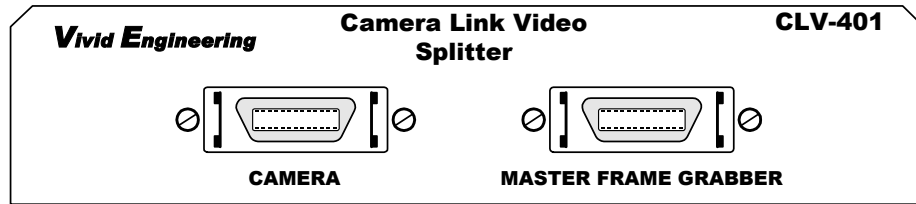


Figure 2-1: CLV-401 Front Panel

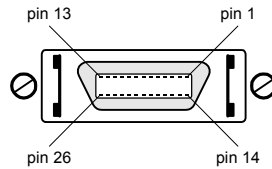


Figure 2-2: MDR-26 Connector Pin Positions

2.2. Rear Panel Connections

The CLV-401 Camera Link™ Video Splitter rear panel is shown in Figure 2-3. The rear panel contains the 26-pin MDR video connector for the slave frame grabber, a power on indicator, on-off switch, and DC power jack. DC power jack accepts 5-7 volts DC. Polarity is center-positive.

The MDR-26 connector is 3M p/n 10226-55G3VC as specified in the Camera Link Spec. Figure 2-2 identifies the MDR-26 pin positions.

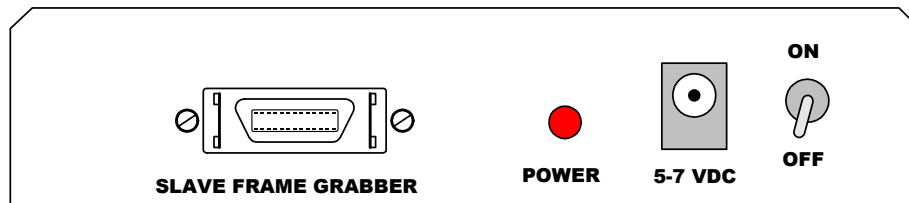


Figure 2-3: CLV-401 Rear Panel

2.3. Video Connector Signals

The MDR-26 video connector signal assignments comply with the Camera Link™ “base” configuration. The *camera* connector signal assignments correspond to the frame grabber interface defined in the Camera Link Specification. Conversely, the *frame grabber* connector assignments are as defined for the camera interface in the Camera Link Specification. This arrangement provides compatibility with standard Camera Link™ cables.

Table 2-1 identifies the signal assignments for the MDR-26 video connectors.

2.4. Cable Shield Grounding

Camera and frame grabber cable “outer” shields are connected to the CLV-401 aluminum case. The case is isolated from the CLV-401 circuitry and the cable “inner” shields.

The frame grabber cable “inner” shield connects to circuit digital ground, maintaining signal reference levels between the CLV-401 and the frame grabber.

The Camera Link™ Specification recommends that a provision be incorporated into frame grabbers that enable the inner shields be tied to digital ground either directly, or through a parallel R/C network. In CLV-401, the *camera connector* represents the Camera Link™ frame grabber interface. To incorporate this flexibility, the CLV-401 ties the inner shields from the camera connector to digital ground through 0-ohm resistors. If necessary, the 0-ohm resistors may be replaced with a parallel RC network.

Table 2-1: MDR-26 Connector Assignments

Camera Link Signal Name	Camera Connector Pin # (frame grabber pinout)	Frame Grabber Connectors Pin # (camera pinout)	Signal Direction
Inner shield	1	1	N/A
Inner shield	14	14	N/A
X0-	25	2	CAM → FG
X0+	12	15	CAM → FG
X1-	24	3	CAM → FG
X1+	11	16	CAM → FG
X2-	23	4	CAM → FG
X2+	10	17	CAM → FG
Xclk-	22	5	CAM → FG
Xclk+	9	18	CAM → FG
X3-	21	6	CAM → FG
X3+	8	19	CAM → FG
SerTC+	20	7	FG → CAM ¹
SerTC-	7	20	FG → CAM ¹
SerTFG-	19	8	CAM → FG ²
SerTFG+	6	21	CAM → FG ²
CC1-	18	9	FG → CAM ¹
CC1+	5	22	FG → CAM ¹
CC2+	17	10	FG → CAM ¹
CC2-	4	23	FG → CAM ¹
CC3-	16	11	FG → CAM ¹
CC3+	3	24	FG → CAM ¹
CC4+	15	12	FG → CAM ¹
CC4-	2	25	FG → CAM ¹
Inner shield	13	13	N/A
Inner shield	26	26	N/A

"FG" = Frame Grabber, "CAM" = Camera

¹ Unused input on *slave* interface, 100-ohm signal termination provided

² Unused output on *slave* interface, no internal connection

3. Mechanical

3.1. Dimensions

The CLV-401 Camera Link™ Video splitter cabinet dimensions are shown in Figure 3-1.

The CLV-401 is housed in a sturdy aluminum enclosure. The body is extruded aluminum, with detachable front and rear endplates. The enclosure incorporates a mounting flange. The flange contains four predrilled holes (0.15" diameter) for convenient equipment mounting. A mounting hole template drawing is provided in Figure 3-2.

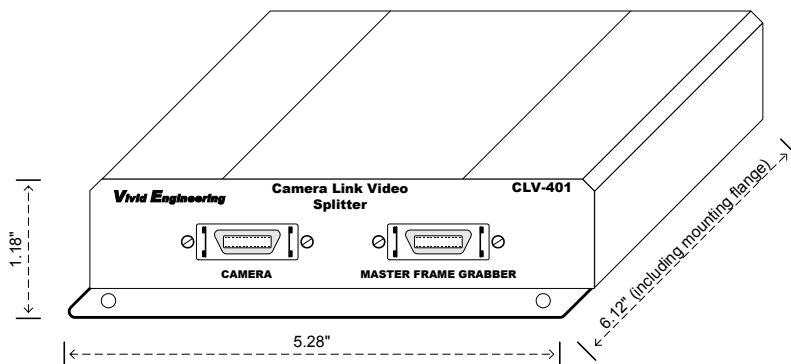


Figure 3-1: CLV-401 Cabinet Dimensions

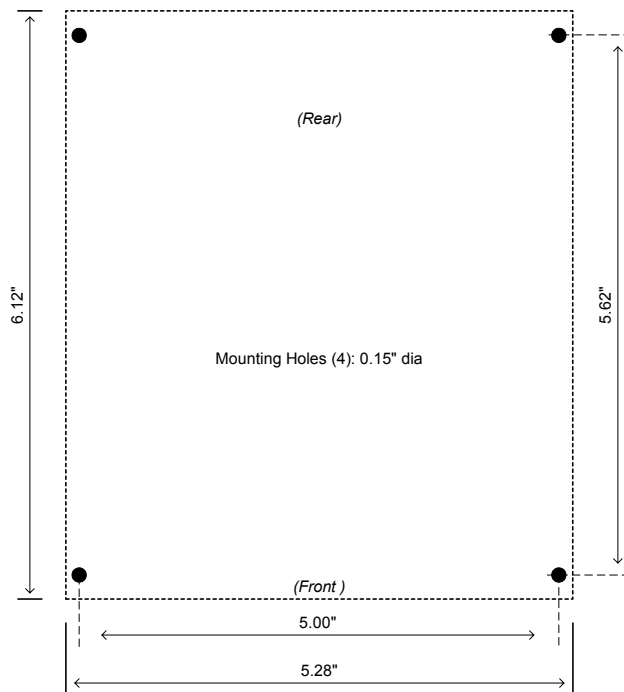


Figure 3-2: Mounting Hole Template

3.2. External Power Supply

The CLV-401 is powered by 5-7 VDC and incorporates a standard 2.1 x 5.5 mm DC power jack. Power plug polarity is center-positive.

The optional multi-nation wall-mount power supply handles a wide power range (90-264 VAC, 47-63 Hz) and comes with a set of outlet plugs suitable for most countries (US, Europe, UK, etc).

The CLV-401 is protected by an internal resettable fuse.

4. Regulatory Compliance

4.1. FCC Compliance Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide a reasonable protection against harmful interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

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

4.2. Canadian Compliance Statement

This digital apparatus 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.

4.3. EU Notice (European Union)

Warning: This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

This device complies with EC Directive 89/336/EEC for a Class A digital device. It has been tested and found to comply with EN55022, EN55024, and EN61326.

5. Revision History

Table 5-1: CLV-401 User's Manual Revision History

Document ID #	Date	Changes
200205-prelim	3/18/04	Preliminary release of manual
200205-1.0	4/26/04	Initial release of manual
200205-1.1	8/10/04	CE compliance, power supply optional
200205-1.2	6/12/06	Updated enclosure